State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

APPENDICES

FOR THE

Report for the Application (Tulare County) and Ambient (Fresno County) Air Monitoring of Simazine

Engineering and Laboratory Branch

Monitoring and Laboratory Division

Project No. C97-072 (Application)
C97-071 (Ambient)

Date: November 17, 1999

APPENDIX I

SAMPLING PROTOCOL

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

Protocol for the Application (Ventura County) and Ambient (Fresno County) Air Monitoring of Simazine During Winter, 1998

Engineering and Laboratory Branch
Monitoring and Laboratory Division

Project No.
C97- 071 Ambient
C97-072 Application

Date: February 6, 1998

APPROVED:

Kevin Mongar, Project Engineer

Cynthia L. Castronovo, Manager
Testing Section

George Lew, Chief
Engineering and Laboratory Branch

This protocol has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Protocol for the Application (Ventura County)
and Ambient (Fresno County)
Air Monitoring of Simazine
During Winter, 1998

I. Introduction

At the request of the California Department of Pesticide Regulation (DPR) (August 28, 1997 Memorandum from John Sanders to George Lew), the Air Resources Board (ARB) staff will determine airborne concentrations of the pesticide simazine in Fresno County over a six week ambient monitoring program during February and March of 1998. The application monitoring, which is conducted for 3 days following an application, will occur in Ventura County during November/December of 1998. This monitoring will be done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions .... of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. Ambient monitoring will be conducted to coincide with the use of simazine as an herbicide on grapes. Application monitoring will be conducted to coincide with simazine use associated with avocado, lemon, or orange groves.

The draft method development results and "Standard Operating Procedures for the Analysis of Simazine in Ambient Air" are included as Attachment I.

II. Chemical Properties of Simazine

Simazine (CAS:122-34-9) exists as colorless to white crystalline solid. It has a molecular formula of $C_7H_{12}C1N_5$, formula weight of 201.66 g/mole, and specific density of 1.203 at 20/4°C.

Simazine has a water solubility of 20 mg/L at 24°C, vapor pressure of 810 nPa at 20°C, and Henry's Constant of 6.4 x 10^{-6} atm·m^3/mol at 20-24°C. Simazine is slightly soluble in organic solvents at 20°-25°C: chloroform (900 mg/L), methanol (400 mg/L), and ethyl ether (300 mg/L). The photolytic half-life of simazine on glass plates is 108.17 hours (absorptance λ =53.25 nm, initial concentration 6.7μg).

The half-life of simazine in soil depends on soil pH, soil water content and soil organic matter content. Under laboratory conditions, the average half-life of simazine is 75 days (Alva and Singh, 1991) ranging from 45 in Hatzenbühl soil (pH 4.8) to 100 days, Neuhofen soil (pH 6.5).

The acute oral LD_{50} of technical simazine has been reported to be greater than 5,000 mg/kg for rats (Ashton and Monaco, 1991); however, RTECS (1985) reports the acute oral LD_{50} to be 950 mg/kg. Simazine's LC_{50} (96 hour) is 90 mg/L for bluegill sunfish, and >100 mg/L for rainbow trout and crucian carp. Simazine entered the risk assessment process at DPR under the SB 950 (Birth Defect Prevention Act of 1984) based on potential combined oncogenic and chronic toxicity.

III. Sampling

Samples will be collected by passing a measured volume of ambient air through XAD-2 resin

(SKC #226-30-06). The flow rate of 3 Lpm will be accurately measured and the sampling system operated continuously with the exact operating interval noted. The resin tubes will be protected from direct sunlight and supported about 1.5 meters above the ground during application monitoring sampling periods and 1.5 meters above roof tops for the ambient monitoring. At the end of each sampling period, the tubes will be capped and placed in culture tubes with an identification label affixed. Subsequent to sampling, the sample tubes will be stored and transported in an ice chest on dry ice, as soon as reasonably possible, to the ARB Monitoring and Laboratory Division, Testing Section laboratory for analysis. The samples will be stored in the freezer or extracted and analyzed immediately.

A sketch of the sampling apparatus is shown in Figure 2. Calibrated rotameters will be used to set and measure sample flow rates. Samplers will be leak checked prior to and after each sampling period with the sampling cartridges installed. Any change in the flow rates will be recorded in the field log book. The field log book will also be used to record start and stop times, sample identifications and any other significant data.

Ambient Monitoring

The use patterns for simazine suggest that monitoring should occur in Fresno County during the months of February and March. Four sampling sites have been selected from the areas of Fresno County where grape farming is predominant and in relatively high-population areas or in areas frequented by people with considerations for both accessibility and security of the sampling equipment. Background samples will be collected in an area distant to simazine applications. At each site, twenty-four discrete 24-hour samples will be taken during the sampling period. Replicate (collocated) samples will be collected for six dates (each Wednesday) at each sampling location. Addresses for the sites are listed in Table 1.

TABLE 1. Ambient Sampling Sites

CHW	Central High West 2045 North Dickenson	(209) 276-5205 Carl Campbell
ARB	Air Resources Board, Ambient Air Monitoring Station Cal-Exico, CA	(209) 228-1825 Pete Ouchida
ALV	Alvina Elementary School 295 W. Saginaw Caruthers, CA 93609	(209) 864-9411 Larry Wison, Superintendant
FOW	Fremont Middle School	(209) 834 2591 Eric Cederquist, Assist, Sup.
PAR	Parlier High School 601 3rd Street Parlier, CA 93648	(209) 646-3574 Glenn Bundy, Principal

The samples will be collected by ARB personnel over a six week period from (tentatively) February 17 - March 31, 1998. 24-hour samples will be taken Monday through Friday (4 samples/week) at a flow rate of 3 L/minute.

Application Monitoring

The use pattern for simazine suggests that application-site monitoring should be conducted during the months of November or December in Ventura County, and that the monitoring be associated with applications of simazine to avocado, lemon or orange groves. A three day monitoring period will be established with desired sampling times as follows: Application + 1 hour, followed by one 2-hour sample, one 4-hour sample, two 8-hour samples, and two 24-hour samples. A minimum of four samplers will be positioned, one on each side of the field. A fifth sampler will be collocated at one position. Since simazine is extensively used in the area, background (before application) samples should be collect for a minimum of 12 hours at 3 liters/min. Ideally, samplers should be placed at a minimum of 20 meters from the field. If possible the samplers will be spaced equidistant from the edges of the field.

We will also provide in the monitoring report: 1) An accurate record of the positions of the monitoring equipment with respect to the field, 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, etc., 3) meteorological data collected at a minimum of 15 minute intervals including wind speed and direction, humidity, and comments regarding degree of cloud cover, 4) the elevation of each sampling station with respect to the field and 5) the orientation of the field with respect to North (identified as either true or magnetic north). Samples collected during fog episodes will be designated as such.

V. Analysis

The draft method development results and "Standard Operating Procedures for the Sampling and Analysis of Simazine in Ambient Air" are included as Attachment I. The procedures consist of extraction of the sorbent with 2.5 mL of ethyl acetate followed by GC/MSD analysis. The analytical method detection limit (MDL) is approximately 3.60 ng per sample. The practical quantitation limit (PQL) is approximately 18.0 ng per sample. The MDL calculation is: MDL=3.14(S) for n=7, and the PQL calculation is: PQL=5 x MDL. The above PQL value corresponds to approximately 0.51 pptv for simazine.

VI. Quality Assurance

Field Quality Control for the ambient monitoring will include:

1) Five field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling). The field spikes will be obtained by sampling ambient air at the background monitoring site for 24 hour periods at 3 L/minute (i.e., collocated with a background sample).

2) Five trip spikes prepared at the same level as the field spikes.

3) Five lab/freezer spikes prepared at the same level as the field and trip spikes.

4) Replicate samples will be taken for three dates at each sampling location.

5) A Trip blank will be obtained each week of sampling.

Field Quality Control for the a application monitoring will include:

1) Four field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling). The field spikes will be obtained by sampling ambient air during background monitoring at the application site for the same duration as the background samples at 3 L/minute (i.e., collocated with background samples).

2) Four trip spikes prepared at the same level as the field spikes.

3) Four lab/freezer spikes prepared at the same level as the field and trip spikes.

4) Replicate samples will be taken for all samples at one of the sampling locations.

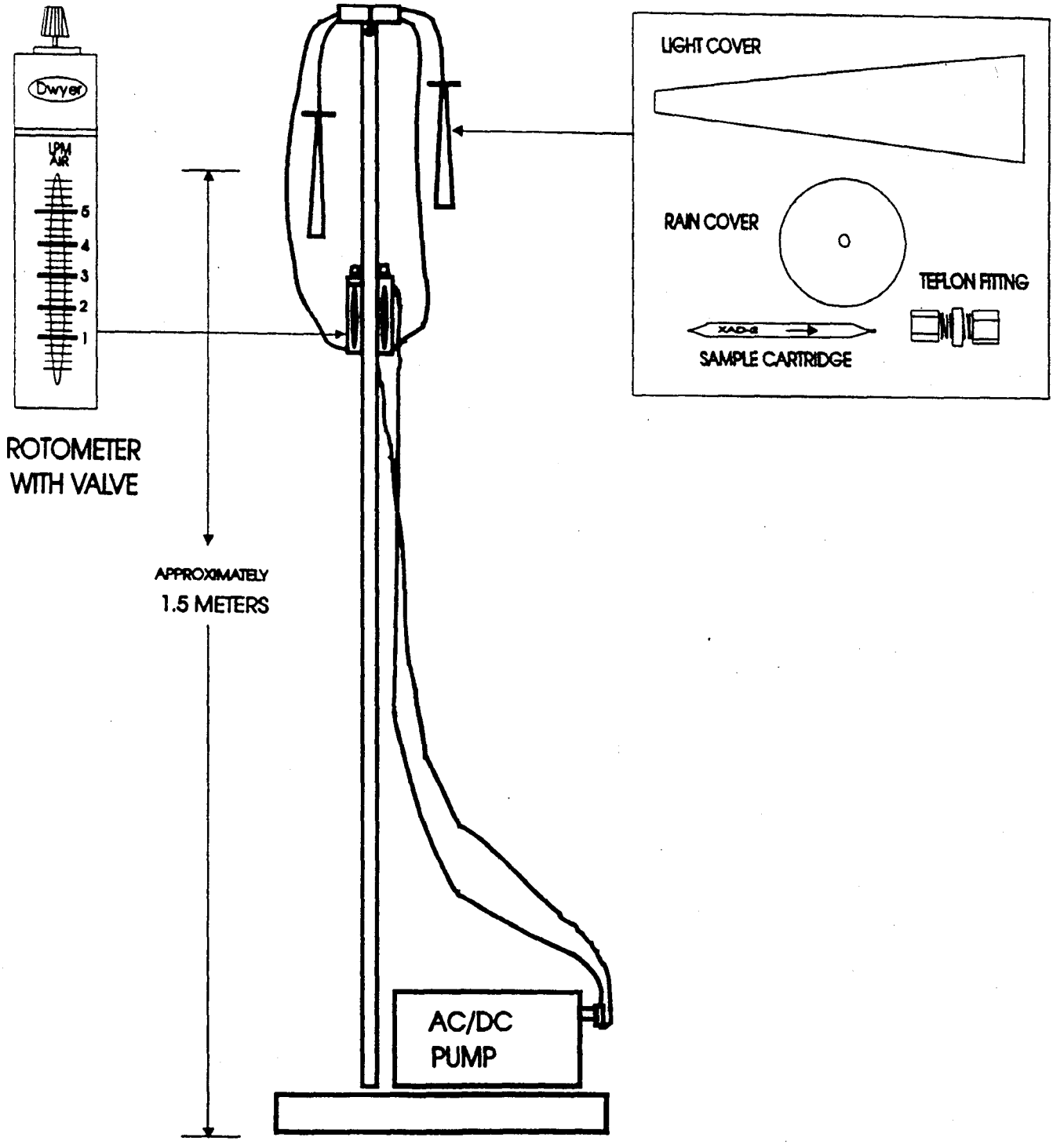
5) A Trip blank will be obtained.

The instrument dependent parameters (reproducibility, linearity and minimum detection limit) will be checked prior to analysis. A chain of custody sheet will accompany all samples. Rotameters will be calibrated prior to and after sampling in the field.

VII. Personnel

ARB personnel will consist of Kevin Mongar (Project Engineer) and an Instrument Technician and/or a student assistant from either the Testing Section or the Air Monitoring Central Section of ARB.

FIGURE 1. SAMPLE TREE



Attachment I

Standard Operating Procedures for the
Analysis of Simazine in Ambient Air

State of California
Air Resources Board
Monitoring and Laboratory Division/ELB

Draft Standard Operating Procedure for the Sampling and Analysis of Simazine in Ambient Air
2/06/98 Version

Analyst: Ken Kiefer and R. Okamoto
Reviewed by: R. Okamoto
Kevin Mongar

1. SCOPE

This is a sorbent tube, solvent extraction, gas chromatography/mass spectrometry method for the determination of simazine from ambient air samples.

2. SUMMARY OF METHOD

The exposed XAD-2 resin tubes (SKC #226-30-06) are stored in an ice chest on dry ice or freezer until desorbed during sonication into 2.5 ml of ethyl acetate. The sorbent is spiked with 500ng of Simazine-$^{13}C_3$ prior to extraction. The splitless injection volume is 4 ul. A gas chromatograph with a DB-35 capillary column and a quadrapole mass spectrometer (MS) is used for analysis. The MS detector is operated in selected ion monitoring mode.

3. INTERFERENCES/LIMITATIONS

Method interferences may be caused by contaminants in solvents, reagents, glassware and other processing apparatus that can lead to discrete artifacts or elevated baselines. Co-eluting compounds trapped during sample collection may also interfere. A method blank must be done with each batch of samples to detect any possible method interferences.

4. EQUIPMENT AND CONDITIONS

A. INSTRUMENTATION:

Hewlett Packard 5890 chromatograph
Hewlett Packard 5971A mass selective detector
Hewlett Packard 8200 Autosampler

Detector: 280°C
Injector: 250°C
Injector Liner: Double goose neck liner with glass wool
Column: J&W Scientific DB-17MS, 30 meter, 0.25 mm i.d., 0.25 um film thickness.
Pre-column: J&W Scientific deactivated fused silica, 2 meter, 0.32 mm i.d.

GC Temp. Program: Initial 50°C, hold 5 min., to 220°C @ 25°C/min., hold 2 min., to 280°C @ 5°C/min., hold 1 min.
Injector:

Pressure Pulse: Initial 6.4 psi, to 40 psi @ 99 psi/min, hold 1.31 min, to 6.4 psi @ 99 psi/min

Splitless: Purge on 2 min.

Gas Flows:

Column: Linear velocity: 32 cm/sec, electronic pressure control (6.4 psi @ 50 C).

Auto Sampler:

Sample washes - 1, Sample pumps - 4, Sample Volume - 4 stops, Viscosity delay - 0 sec, Solvent A washes - 4, Solvent B washes - 4

Mass Spectrometer:

Electron Ionization

Selective Ion Monitoring; Simazine - 201 (quant. ion, 100%), 186 (qual. ion, 45%), 173 (qual. ion, 19%). Simazine-$^{13}C_3$ - 204 (quant. ion, 100%), 70 (qual. ion, 140%), 185 (qual. Ion, 95%)

Tuning: PFTBA

B. AUXILIARY APPARATUS:

1. Glass amber vials, 8 mL capacity.
2. Vial Shaker, SKC, or equiv.
3. Sonicator, Branson 2210
4. Autosampler vials with septum caps.

C. REAGENTS

1. Ethyl Acetate, Pesticide Grade, or better
2. Simazine 99, -% pure or better (e.g., from Chem Service).
3. Simazine $^{13}C_3$ 99, -% pure or better (e.g., from Cambridge Isotope Laboratories)

5. ANALYSIS OF SAMPLES

1. A daily manual tune shall be performed using PFTBA. The instrument is tuned using masses - 69, 219, 502. The criteria for the tune are the peak widths at ½ the peak height, 0.5 ± .05, and the relative abundance; 69 - 100%; 219 - 65%, 502 - 2%.

2. It is necessary to analyze a solvent blank with each batch of samples. The blank must be free of interferences. A solvent blank must be analyzed after any sample which results in possible carry-over contamination.

3. A single point calibration check at the midpoint of the calibration curve shall be analyzed daily and the calibration updated, if it is within 20% of the average response factor from the previous 5 point calibration curve. If it is outside 20%, a new 5 point multipoint curve must be run.

4. At least one calibration sample must be analyzed for each batch of ten samples. The response of the standard must be within 20% of previous calibration analyses.

5. Carefully score the secondary section end of the sampled XAD-2 tube above the glasswool and break at the score. Remove the glass wool plug from the secondary XAD end of the XAD-2 tube with forceps and place it into an 4 mL amber colored sample vial. Pour the XAD-2 into the vial.

6. Spike the back end of the primary XAD with 12.5 ul of 20 ng/ml Simazine $^{13}C_3$. Let the solvent evaporate for at least 10 minutes. Remove the middle glass wool plug and store in the 4 mls amber vial. Retain the secondary section of the XAD-2 tube for later analysis if needed to check the possibility of breakthrough.

7. Pour the primary XAD into a 8 ml vial. Remove the from glasswool plug and put into the 8 ml vial. Rinse the tube with 2.5 mls of ethyl acetate and pour rinse into the 8 ml vial.

9. Place the sample vial on a desorption shaker (or ultra sonic water-bath) for 30 minutes. Remove the simazine extract and store in a second vial at -20°C until analysis.

10. After calibration of the GC system, inject 4.0 ul of the extract. If the resultant peaks for simazine has a measured concentration greater than that of the highest standard injected, dilute the sample and re-inject.

11. Calculate the concentration in ng/mL based on the data system calibration response factors. If the sample has been diluted, multiply the calculated concentration by the dilution factor.

12. The atmospheric concentration is calculated according to:

Conc., ng/m^3 = (Extract Conc., ng/mL X 2.5 mL) / Air Volume Sampled, m^3

6. QUALITY ASSURANCE

A. INSTRUMENT REPRODUCIBILITY

Five injections of 4 ul each were made of simazine standards at three concentrations in order to establish the reproducibility of this instrument. This data (Testing Section lab, 12/12/98) is shown in Table 1.

TABLE 1. Instrument Reproducibility

Simazine-$^{13}C_3$ Amt. (ng/ml)	Simazine-$^{13}C_3$ Response	Simazine Amt. (ng/ml)	Simazine Response	Amt. Ratio	Resp Ratio	Response Ratio RSD
100	5425	12.5	670	.125	.124	
100	5110	12.5	734	.125	.144	
100	4672	12.5	646	.125	.138	
100	5327	12.5	838	.125	.157	
100	5316	12.5	757	.125	.142	8.65
100	5277	50	2547	.50	.480	
100	5938	50	2802	.50	.472	
100	5678	50	2805	.50	.494	
100	5917	50	2746	.50	.464	
100	5840	50	2747	.50	.470	2.42
100	5055	250	11546	2.5	2.28	
100	6330	250	14920	2.5	2.36	
100	5138	250	11603	2.5	2.26	
100	6173	250	14314	2.5	2.32	
100	6359	250	14953	2.5	2.35	1.87

B. LINEARITY

A five point calibration curve was made on 12/11/97. The calibration range was 250 ng/mL to 12.5 ng/mL simazine. The corresponding response factor linear regression equation is:

Response Ratio = $(9.85 \times 10^{-1}) * (\text{Amount Ratio})$ RF Rel. Std. Dev. = 7.0%

where:

Response Ratio = (Simazine response)/(Simazine-$^{13}C_3$ response)

Amount Ratio = (Simazine concentration)/(Simazine-$^{13}C_3$ concentration)

Using EPA format, to minimize the number of calibrations performed, a midpoint (single point) calibration is performed daily. A laboratory check sample is run daily. If the two analysis are within 20% of the assigned value, then analysis will begin. After every ten samples a calibration sample will be analyzed to verify the system is still in calibration. Alternately a full multi-point calibration curve can be performed before analyzing a batch of samples.

C. MINIMUM DETECTION LIMIT

Detection Limit is based on EPA MDL calculation. Using the analysis of seven replicates of a low level matrix spikes, the method detection limit (MDL), and the pratical quantitation limit (PQL) for simazine were calculated by:

$$MDL = 3.14 * s$$

$$PQL = 5 * MDL$$

where:

s = the standard deviation of the concentration calculated for the seven replicate spikes.

Given s =.46 for the seven samples, the MDL and PQL are calculated as follows, MDL and PQL values are rounded to one place.

$$MDL = 3.14 * .46 = 1 \ (1.45) \ pg/ul$$
$$PQL = 5 * 1.45 = 7.23 \ pg/ul$$

Based on the 2.5 mL extraction volume and assuming a sample volume of 4.32 m^3 (3 lpm for 24 hours) the PQL for ambient concentration of simazine is :

$$(7.23 \ ng/mL)(2.5 \ mL) \ / \ (4.32 \ m^3) = 4.18 \ ng/m^3 \ \text{per 24-hour sample}$$

D. COLLECTION AND EXTRACTION EFFICIENCY (RECOVERY)

62.5 ng of simazine standard were spiked on the primary section of each of six XAD-2 sampling tubes. The spiked tubes were then subjected to an air flow of 3 lpm for 24 hours. The samplers were set-up at 13th and T St. at an ambient temperature of approximately 30°C (maximum). The primary section was then extracted with ethyl acetate and analyzed. Percent recoveries of simazine from primary sections of three tubes analyzed within one week of sampling were 82.3%, 86.2%, 87.9% with an average of 85.5% and the percent recoveries of three tubes analyzed within two weeks of sampling were 73.2%, 80.4%, and 74.3 with an average of 75.9%.

E. STORAGE STABILITY

Storage stability studies were conducted over a 4 week period. The primary sections of 19 tubes were spiked with 62.5 ng of simazine. The spiked tubes were stored in the freezer at -20^{0}C and extracted/analyzed on storage weeks 1,2,3 and 4. Four tubes each were analyzed on week 1and 5 tubes each were analyzed on weeks 2, 3, and 4. The storage recoveries (average results) were 104%, 92.6%, 83.7% and 99.8% for weeks 1,2,3 and 4 respectively.

A second set of tubes were spiked with 1250 ngs of simazine. The spiked tubes were stored in the freezer at -20^{0}C and extracted/analyzed on storage weeks 1,3 and 4. Five tubes each were analyzed on week 1, 3, and 4. The storage recoveries (average results) were 91.3%, 83.2%, and 82.0% respectively.

F. BREAKTHROUGH

The primary sections of four tubes were spiked with 750 ng simazine/tube then run for 24 hours at 3 lpm (see Section D above). No simazine was detected in the back-up resin bed of any of the tubes.

G. Safety

Simazine is highly toxic if inhaled, moderately toxic if ingested, and slightly toxic via dermal exposure. The LD_{50} ranges is >5,000 mg/kg/day for rats. The 4-hour inhalation LC50 in rates is 2 mg/m^3. EPA has classified simazine as a possible human carcinogen because it may have caused cancer in test animals which received high doses over the course of their lifetimes.

APPENDIX II

LABORATORY REPORT

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman
2020 L Street • P.O. Box 2815 • Sacramento, California 95812 •

Winston H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

MEMORANDUM

TO: Cindy Castronovo, Manager
Testing Section

FROM: Robert Okamoto, Lead Laboratory Chemist
Testing Section

DATE: March 4, 1999

SUBJECT: SIMAZINE LABORATORY RESULTS AND METHOD DEVELOPMENT

Included in the attached report are the following items:

1. Ambient and application simazine analytical results.
2. Simazine standard operating procedure.
3. Quality assurance report.
4. Spike and blank results.
5. Background blank levels.
6. Chromatogram and extracted ion profiles.
7. Simazine field spike total ion chromatogram.
8. Extracted ion profile for simazine in a sample.
9. Extracted ion profile for simazine at the estimated quantitation limit.
10. Extracted ion profile for simazine in the resin blank.

State of California
California Environmental Protection Agency
Air Resources Board

Testing Section Laboratory Report

Simazine Method Development and Simazine Analytical Results for Ambient Monitoring and Application Samples

Engineering and Laboratory Branch
Monitoring and Laboratory Division

Project No. C97-071 and C97-072
February 26, 1999

1.0 Introduction

The Air Resources Board (ARB) staff developed an air sampling and analysis method for simazine. Ambient air samples were collected and analyzed by ARB staff. This report covers simazine method development, simazine analytical results, and quality assurance results.

2.0 Method Development and Standard Operating Procedure.

In the Fall of 1997 an isotope dilution simazine procedure was developed and validated. The standard operating procedure (SOP) includes procedures that closely match US Environmental Protection Agency methodology. The standard operating procedure is given in Attachment 1.

3.0 Ambient Sample Results.

A total of 165 samples were analyzed for the ambient monitoring. All samples except for four were analyzed within 27 days of receipt. Four samples ALV04, CHW08, ARB08, and ARB14 were extracted within 27 days of receipt but not analyzed until 7/02/98. These samples were misqueued and were not analyzed until the QA review was performed on 6/98. Control samples LC-15 and LC-16 first analyzed on 3/30/98 were still in control when analyzed on 7/02/98 indicating samples ALV04, CHW08, ARB08, and ARB-14 were still valid when analyzed on 7/02/98.

3.1 Samples Received:

Ambient Samples
150 ambient samples
5 field spikes
5 trip spikes
5 laboratory spikes
0 trip blanks

Date Samples Received	Date Analysis Completed
2/24/98	2/26/98
2/26/98	3/02/98[1]
3/03/98	3/30/98
3/09/98	3/31/98[2]
3/17/98	3/17/98[3]
3/24/98	4/03/98
4/06/98	4/09/98

[1]Except ALV04 which was analyzed by 7/02/98
[2]Except CHW08, ARB08 which were analyzed by 7/02/98
[3]Except ARB14 which was analyzed by 7/02/98

Table 1 presents the results of the analysis of the simazine ambient samples. Also included in Table 1 are the dates the laboratory received and analyzed the samples. An asterisk to the right of the simazine amount denotes the sample was analyzed in duplicate and the results are the average of the two analyses.

Background levels of simazine were detected in all the laboratory solvent blanks. The background was probably due to simazine impurity in the simazine-$^{13}C_3$ (99% pure) internal standard. The average background level was 1.2 pg/ul, which was near the method detection limit. To distinguish actual simazine levels from background levels, 3 times the standard deviation of the seven laboratory blanks was added to the average background level. This corresponded to a level of 9.6 ng/sample. Levels between 9.6 ng/sample and the EQL were reported as detected (det). Levels above the EQL of 18.2 ng/sample was reported as the actual measured value and were reported to three significant figures.

Table 1. Simazine Ambient Results

Log ID	Sample Name	Date Received	Date Received	Simazine Amount (ngs/sample)	
1	PAR01	2/24/98	02/25/98	BKG	
2	PAR01D	2/24/98	02/25/98	BKG	
3	FOW01	2/24/98	02/25/98	BKG	
4	FOW01D	2/24/98	02/25/98	Det	
5	ALV01	2/24/98	02/25/98	Det	
6	ALV01D	2/24/98	02/25/98	BKG	
7	CHW01	2/24/98	02/25/98	BKG	
8	CHW01D	2/24/98	02/26/98	BKG	
9	ARB01	2/24/98	02/26/98	BKG	
10	ARB01D	2/24/98	02/26/98	BKG	*
11	FS01	2/24/98	02/26/98	5.43E+1	
12	FS02	2/24/98	02/26/98	5.18E+1	
13	PAR02	2/24/98	02/26/98	BKG	
14	FOW02	2/24/98	02/26/98	BKG	
15	ALV02	2/24/98	02/26/98	BKG	
16	CLW02	2/24/98	02/26/98	BKG	
17	ARB02	2/24/98	02/26/98	BKG	
18	FS03	2/24/98	02/26/98	4.87E+1	
19	FS04	2/24/98	02/26/98	5.38E+1	
20	FS05	2/24/98	02/26/98	5.31E+1	*
21	TS01	2/24/98	02/26/98	6.02E+1	
22	TS02	2/26/98	03/02/98	6.11E+1	
23	PAR03	2/26/98	03/02/98	BKG	
24	FOW03	2/26/98	03/02/98	BKG	
25	ALV03	2/26/98	03/02/98	<MDL	
26	CHW03	2/26/98	03/02/98	BKG	
27	ARB03	2/26/98	03/02/98	<MDL	
28	PAR04	2/26/98	03/02/98	BKG	
29	FOW04	2/26/98	03/02/98	Det	
30	ALV04	2/26/98	07/02/98	BKG	
31	CHW04	2/26/98	03/02/98	BKG	
32	ARB04	2/26/98	03/02/98	BKG	*
33	PAR05	3/3/98	03/30/98	BKG	
34	PAR05D	3/3/98	03/30/98	BKG	
35	FOW05	3/3/98	03/30/98	BKG	

Log ID	Sample Name	Date Received	Date Analyzed	Simazine Amount (ng/sample)	
36	FOW05D	3/3/98	03/30/98	BKG	
37	ALV05	3/3/98	03/30/98	BKG	
38	ALV05D	3/3/98	03/30/98	BKG	
39	CHW05	3/3/98	03/30/98	BKG	
40	CHW05D	3/3/98	03/30/98	BKG	
41	ARB05	3/3/98	03/30/98	BKG	
42	ARB05D	3/3/98	03/30/98	BKG	*
43	PAR06	3/3/98	03/30/98	BKG	
44	FOW06	3/3/98	03/30/98	Det	
45	ALV06	3/3/98	03/30/98	<MDL	
46	CHW06	3/3/98	03/30/98	BKG	
47	ARB06	3/3/98	03/30/98	BKG	
48	PAR07	3/9/98	03/30/98	BKG	
49	FOW07	3/9/98	03/30/98	7.69E+1	
50	ALV07	3/9/98	03/31/98	2.07E+1	
51	CHW07	3/9/98	03/31/98	3.32E+1	
52	ARB07	3/9/98	03/31/98	BKG	
53	TS03	3/9/98	07/02/98	5.34E+1	
54	TS04	3/9/98	07/02/98	5.02E+1	
55	TS05	3/9/98	04/01/98	6.26E+1	
56	PAR08	3/9/98	03/31/98	Det	*
57	FOW08	3/9/98	03/31/98	BKG	
58	ALV08	3/9/98	03/31/98	<MDL	
59	CHW08	3/9/98	07/02/98	Det	
60	ARB08	3/9/98	07/02/98	BKG	*
61	PAR09	3/9/98	03/31/98	BKG	
62	PAR09D	3/9/98	03/31/98	<MDL	
63	FOW09	3/9/98	03/31/98	<MDL	
64	FOW09D	3/9/98	03/31/98	Det	
65	ALV09	3/9/98	03/31/98	Det	
66	ALV09D	3/9/98	03/31/98	BKG	
67	CHW09	3/9/98	03/31/98	Det	
68	CHW09D	3/9/98	03/31/98	Det	
69	ARB09	3/9/98	03/31/98	BKG	
70	ARB09D	3/9/98	04/01/98	BKG	*
71	PAR10	3/9/98	04/01/98	BKG	
72	FOW10	3/9/98	04/01/98	BKG	
73	ALV10	3/9/98	04/01/98	Det	

Log ID	Sample Name	Date Received	Date Analyzed	Simazine Amount (ng/sample)	
74	CHW10	3/9/98	04/01/98	BKG	
75	ARB10	3/9/98	04/01/98	BKG	
76	PAR11	3/17/98	04/01/98	Det	
77	FOW11	3/17/98	04/01/98	Det	
78	ALV11	3/17/98	04/01/98	1.79E+1	
79	CHW11	3/17/98	04/01/98	2.17E+1	
80	ARB11	3/17/98	04/01/98	BKG	
81	PAR12	3/17/98	04/01/98	Det	*
82	FOW12	3/17/98	04/01/98	2.06E+1	
83	ALV12	3/17/98	04/01/98	Det	
84	CHW12	3/17/98	04/01/98	3.05E+1	
85	ARB12	3/17/98	05/04/98	BKG	
86	PAR13	3/17/98	05/04/98	Det	
87	PAR13D	3/17/98	05/04/98	1.90E+1	
88	FOW13	3/17/98	05/04/98	2.38E+1	
89	FOW13D	3/17/98	05/04/98	2.95E+1	
90	ALV13	3/17/98	05/04/98	2.09E+1	
91	ALV13D	3/17/98	05/04/98	2.09E+1	
92	CHW13	3/17/98	05/04/98	2.33E+1	
93	CHW13D	3/17/98	05/04/98	2.32E+1	
94	ARB13	3/17/98	05/04/98	Det	
95	ARB13D	3/17/98	05/04/98	BKG	*
96	PAR14	3/17/98	05/05/98	Det	
97	FOW14	3/17/98	05/05/98	2.42E+1	
98	ALV14	3/17/98	05/05/98	Det	
99	CHW14	3/17/98	05/05/98	BKG	
100	ARB14	3/17/98	07/02/98	BKG	
101	PAR15	3/24/98	04/02/98	BKG	
102	FOW15	3/24/98	04/02/98	2.47E+1	
103	ALV15	3/24/98	04/02/98	Det	
104	CHW15	3/24/98	04/02/98	2.93E+1	
105	ARB15	3/24/98	04/02/98	BKG	
106	PAR16	3/24/98	04/02/98	BKG	
107	FOW16	3/24/98	04/02/98	1.78E+1	
108	ALV16	3/24/98	04/02/98	Det	
109	CHW16	3/24/98	04/02/98	1.80E+1	*
110	ARB16	3/24/98	04/02/98	BKG	
111	PAR17	3/24/98	04/02/98	Det	

Log ID	Sample Name	Date Received	Date Analyzed	Simazine Amount (ng/sample)	
112	PAR17D	3/24/98	04/03/98	BKG	
113	FOW17	3/24/98	04/02/98	1.86E+1	
114	FOW17D	3/24/98	04/03/98	Det	
115	ALV17	3/24/98	04/02/98	1.95E+1	
116	ALV17D	3/24/98	04/03/98	1.98E+1	
117	CHW17	3/24/98	04/02/98	2.10E+1	
118	CHW17D	3/24/98	04/03/98	2.22E+1	
119	ARB17	3/24/98	04/02/98	BKG	
120	ARB17D	3/24/98	04/03/98	BKG	
121	PAR18	3/24/98	04/03/98	Det	
122	FOW18	3/24/98	04/03/98	2.02E+1	
123	ALV18	3/24/98	04/03/98	Det	*
124	CHW18	3/24/98	04/03/98	1.93E+1	
125	ARB18	3/24/98	04/09/98	BKG	
126	PAR19	4/6/97	04/08/98	BKG	
127	FOW19	4/6/97	04/08/98	<MDL	
128	ALV19	4/6/97	04/08/98	Det	
129	CHW19	4/6/97	04/08/98	Det	
130	ARB19	4/6/97	04/08/98	BKG	
131	PAR20	4/6/97	04/08/98	BKG	
132	FOW20	4/6/97	04/08/98	BKG	
133	ALV20	4/6/97	04/08/98	BKG	
134	CHW20	4/6/97	04/08/98	BKG	
135	ARB20	4/6/97	04/08/98	BKG	*
136	PAR21	4/6/97	04/09/98	BKG	
137	PAR21D	4/6/97	04/09/98	BKG	
138	FOW21	4/6/97	04/09/98	BKG	
139	FOW21D	4/6/97	04/09/98	BKG	
140	ALV21	4/6/97	04/09/98	Det	
141	ALV21D	4/6/97	04/09/98	BKG	
142	CHW21	4/6/97	04/09/98	BKG	
143	CHW2D	4/6/97	04/09/98	Det	
144	ARB21	4/6/97	04/09/98	BKG	
145	ARB21D	4/6/97	04/09/98	BKG	
146	PAR22	4/6/97	04/09/98	BKG	
147	FOW22	4/6/97	04/09/98	BKG	
148	ALV22	4/6/97	04/09/98	BKG	
149	CHW22	4/6/97	04/09/98	Det	*

Log ID	Sample Name	Date Received	Date Analyzed	Simazine Amount (ng/sample)	
150	ARB22	4/6/97	04/09/98	BKG	
151	PAR23	4/6/97	04/09/98	BKG	
152	FOW23	4/6/97	04/09/98	BKG	
153	ALV23	4/6/97	04/09/98	BKG	
154	CHW23	4/6/97	04/09/98	BKG	
155	ARB23	4/6/97	04/09/98	BKG	
156	PAR24	4/6/97	04/09/98	BKG	
157	FOW24	4/6/97	04/09/98	BKG	
158	ALV24	4/6/97	04/09/98	BKG	
159	CHW24	4/6/97	04/09/98	BKG	*
160	ARB24	4/6/97	04/09/98	BKG	

*Average of two analyses

<MDL = Simazine less than 3.8 ng/sample

BKG = Background level of simazine detected in the blank is between 3.8 ng/sample and 9.6 ng/sample

Det = Simazine amount between 9.6 ng/sample (BKG) and 18.2 ng/sample (EQL).

4.0 Simazine Ambient Analytical Quality Control

Two laboratory control spikes and a laboratory control blank were prepared with each batch of samples. A laboratory solvent blank was run and a multi-point calibration or mid-point calibration and calibration check was performed prior to the analysis of a sample set. Calibration check samples and duplicate sample analyses were run during the analysis of a sample set. Additional QC included field spikes, trip spikes, and laboratory spikes. A summary of the QC results is given in this section.

4.1 Mass spectrometer tune

The mass spectrometer was manually tuned prior to the analysis of a batch of samples. Tune parameters are given in the simazine SOP (Attachment 1).

4.2 Laboratory solvent blanks

A laboratory solvent blank was analyzed prior to the analysis of a sample batch. Four batches of ambient simazine samples were analyzed. Table 2 provides the results of the laboratory solvent blanks for the four sample batches. Background levels of simazine were detected in all the laboratory solvent blanks. Background levels of simazine were detected in all the laboratory solvent blanks. The background was probably due to simazine impurity in the simazine-$^{13}C_3$ (99% pure) internal standard. The average background level was 1.2 pg/ul, which was near the method detection level. To distinguish actual simazine levels from background levels, 3 times the standard deviation of the seven laboratory blanks was added to the average background level. This corresponded to a level of 9.6 ng/sample. Levels between 9.6 pg/ul and the EQL were reported as detected (det). Levels above the EQL of 18.2 ng/sample was reported as the actual measured value.

Table 2. Laboratory solvent blanks

Sample Name	Date	Simazine Amount (ng/sample)
RB9802251	2/25/98	<MDL [1]
RB980226	3/02/98	BKG[2]
RB9803261	3/30/98	BKG
RB9803311	3/31/98	BKG
RB9804021	4/02/98	BKG
RB9804081	4/08/98	BKG
RB9805041	5/04/98	BKG
RB980701	7/01/98	BKG

[1]<MDL = Amount less than 3.8 ng/sample

[2]BKG = Amount between 3.8 ng/sample and 9.6 ng/sample.

4.3 Calibration.

A 5-point multi-point calibration was run prior to each batch of samples or a mid-point calibration and a mid-point calibration check was run prior to each batch of samples.

4.4 Laboratory control spikes

Two laboratory control spikes (LCS) were run prior to the analysis of each batch of samples. A sample batch is defined as all the samples that are prepped during the same time period. A LCS is a resin cartridge spiked with 250 ngs or 62.5 ngs of simazine. The control sample is prepared and analyzed the same way as the samples. LCS recoveries ranged from 83.9%-116% and the relative difference between samples in each pair ranged from 2.28% - 13.7%. The results are presented in Table 3.

Table 3. Laboratory control spike results.

Sample Name	Date Analyzed	Simazine Amount (ng/sample)	Simazine Expected (ng/sample)	Percent Recovery	Relative difference
LC09	2/25/98	61.9	62.5	99.0%	
LC10	2/25/98	54.0	62.5	86.3%	13.7%
LC15	3/30/98	240*	250	95.8%	
LC16	3/30/98	214*	250	85.7%	11.1%
LC19	3/30/98	277	250	111%	
LC20	3/30/98	289	250	116%	4.28%
LC21	3/31/98	230	250	92.0%	
LC22	3/31/98	254	250	102%	9.98%
LC25	4/02/98	240	250	96.0%	
LC26	4/02/98	234	250	93.6%	2.52%
LC27	4/08/98	263	250	105%	
LC28	4/08/98	269	250	107%	2.28%
LC29	7/02/98	210	250	83.9%	
LC30	7/02/98	226	250	90.2%	7.18%
LC15	7/02/98	226	250	90.4%	
LC16	7/02/98	213	250	85.3%	5.80%

Relative Difference = 100*(sample1-sample2)/average

4.5 Laboratory control blanks

A single laboratory control blank (LCB) is run prior to the analysis of each sample batch. The LCB blank sample cartridge is prepared and analyzed the same way the samples are analyzed. The LCB results are presented in Table 4. BKG means the level in the blanks were less than 9.6 ng/sample but greater than or equal to 3.8 ng/sample. No simazine was above the background level.

Table 4. Laboratory control blank results

Sample Name	Date Analyzed	Simazine Amount (ng/sample)
LB05	3/30/98	<MDL[1]
LB08	3/30/98	BKG[2]
LB09	3/30/98	BKG
LB10	3/31/98	BKG
LB11	4/02/98	BKG
LB13	4/08/98	BKG
LB14	7/02/98	BKG

[1]<MDL=Amount less than 3.8 ng/sample

[2]BKG = Amount between 3.8 ng/sample and 9.6 ng/sample

4.6 Calibration check samples

Calibration check samples (CCS) are analyzed with each set of samples. A CCS is run after every tenth sample in a sample batch. CCS samples are run to ensure instrument drift does not exceed 20%. CCS sample results are given in Table 5. The average CCS percent recovery was 98.3% of the expected simazine amount with a relative standard deviation of 3.17%

Table 5. Calibration check sample results

Sample Name	Date Run	Simazine Amount (ng/sample)	Simazine Expected (ng/sample)	Percent Recovery
C9802257	2/26/98	245	250	98.0%
C9802258	2/26/98	234	250	93.5%
C9802259	2/26/98	251	250	100%
C980226	3/02/98	235	250	94.0%
C9803261	3/30/98	245	250	98.0%
C9803262	3/31/98	254	250	101%
C9803263	3/31/98	254	250	101%
C9803311	4/01/98	249	250	99.7%
C9803312	4/01/98	247	250	98.9%
C9803313	4/01/98	256	250	102%
C9804021	4/02/98	239	250	95.5%
C9804022	4/03/98	234	250	93.8%
C9804023	4/03/98	251	250	100%
C9804081	4/08/98	250	250	100%
C9804082	4/09/98	257	250	103%
C9804083	4/09/98	247	250	98.7%
C9804084	4/09/98	240	250	95.9%
C9805041	5/05/98	256	250	102%
CC98070101	7/02/98	122	125	97.4%
CC98070102	7/02/98	120	125	96.0%
CC98070103	7/02/98	117	125	93.2%

4.7 Duplicate analysis

Duplicate analysis is performed on every tenth sample in a sample analysis set. Results are given in Table 6. Relative difference was calculated on duplicate pairs when the values were

at or higher than the EQL. The relative difference ranged from 1.01 to 15.1%.

Table 6. Duplicate analysis results

Sample Name	Simazine Amount (ng/sample)	Average (ng/sample)	Relative Difference
ALV18-1	Det[1]		
ALV18-2	Det	NQ[3]	NC[4]
ARB01D-2	Bkg[2]		
ARB01D-2	Bkg	NQ	NC
ARB04-1	Bkg		
ARB04-2	Bkg	NQ	NC
ARB05D-1	Bkg		
ARB05D-2	Bkg	NQ	NC
ARB08-1	Bkg		
ARB08-2	Bkg	NQ	NC
ARB09D-1	Bkg		
ARB09D-2	Bkg	NQ	NC
ARB13D-1	Bkg		
ARB13D-2	Bkg	NQ	NC
CHW16-1	Det		
CHW16-2	18.7	NQ	NC
CHW22-1	Det		
CHW22-2	Bkg	NQ	NC
CHW24-1	Bkg		
CHW24-2	Bkg	NQ	NC
FS05-1	57.1		
FS05-2	49.1	5.31E+1	15.1%
LB09-1	Bkg		
LB09	Bkg	NQ	NC

Sample Name	Simazine Amount (ng/sample)	Average (ng/sample)	Relative Difference
LC15-1	253		
LC15-2	226	2.40E+2	11.3%
LC16-1	215		
LC16-2	213	2.14E+2	1.01%
PAR08-1	Det		
PAR08-2	Det	NQ	NC
PAR12-1	Det		
PAR12-2	Det	NQ	NC

[1]Det= >9.6 ng/sample but ≤ 18.2 ng/sample
[2]Bkg= >3.8 ng/sample but ≤ 9.6 ng/sample
[3]NQ=not quantitated
[4]NC=not calculated
Relative Difference = 100*(analysis1-analysis2)/average

5.0 Field, trip, and laboratory spikes and trip blanks

Five laboratory spikes, five trip spikes and five field spikes were analyzed for the ambient simazine test.

5.1 Laboratory spikes

Five laboratory spikes were spiked with 62.5 ngs of simazine on 2/11/98 and stored in the Testing's Laboratory freezer until they were analyzed on 2/26/98. The laboratory spike results are given in Table 7. The average percent recovery was 91.1% and the relative standard deviation was 7.54%.

Table 7. Laboratory spikes results

Sample Name	Date Spiked	Date Analyzed	Simazine Amount (ng/sample)	Amount Simazine Spiked (ng/sample)	Percent Recovery
LS01	2/11/98	2/26/98	60.2	62.5	96.3%
LS02	2/11/98	2/26/98	51.9	62.5	83.0%
LS03	2/11/98	2/26/98	55.1	62.5	88.2%
LS04	2/11/98	2/26/98	62.5	62.5	100%
LS05	2/11/98	2/26/98	55.1	62.5	88.2%

5.2 Trip spikes

A series of 5 trip spikes were spiked with 62.5 ngs of simazine on 2/11/98. Trip spikes were taken to the sampling site and returned to the laboratory along with a batch of samples, which were analyzed on 2/26/98. The trip spike results are given in Table 8. The average recovery was 92.0% and the relative standard deviation was 9.38%.

Table 8. Trip spike results

Sample Name	Date Spiked	Date Analyzed	Simazine Amount (ng/sample)	Amount Simazine Spiked (ng/sample)	Percent Recovery
TS01	2/11/98	2/26/98	60.2	62.5	96.3%
TS02	2/11/98	3/02/98	61.1	62.5	97.8%
TS03	2/11/98	4/01/98	62.6	62.5	100%
TS04	2/11/98	7/02/98	53.4	62.5	85.4%
TS05	2/11/98	7/02/98	50.2	62.5	80.3%

5.3 Field spikes

A series of 5 field spikes were spiked with 62.5 ngs of Simazine on 2/11/98. Field spikes were taken to the sampling site and ambient air was sampled on the field spikes. An unspiked collocated sample was taken concurrently with the field spikes. The field spike was returned to the laboratory along with a batch of samples. The field spike results are given in Table 9. The average recovery of the field spikes was 83.7% with a relative standard deviation of 4.32%.

Table 9. Field spike results

Sample Name	Colocated blank	Date Analyzed	Simazine Amount in Sample (ng/sample)	Amount Simazine in collocated sample (ng/sample)	Percent Recovery
FS01	ARB-1	2/26/98	53.1	BKG	84.9%
FS02	ARB-1	2/268/98	54.3	BKG	87.0%
FS03	ARB-2	2/26/98	51.8	BKG	82.8%
FS04	ARB-2	2/26/98	48.7	BKG	77.8%
FS05	ARB-2	2/26/98	53.8	BKG	86.1%

BKG = Amount between 3.8 ng/sample and 9.6 ng/sample

5.4 Trip blanks

No trip blanks were collected.

6.0 Application Sample Results.

6.1 Samples Received:

Application Samples
44 ambient samples
4 field spikes
4 trip spikes
4 laboratory spikes
1 trip blanks

Date Samples Received	Date Analysis Completed
1/04/99	1/22/99

Presented in Table 10 are the results of the analysis of the simazine application samples. Also included in Table 10 are the dates the laboratory received and analyzed the samples. An asterisk to the right of the simazine amount denotes the sample was analyzed in duplicate and the results are the average of the two analyses.

Table 10. Simazine Application Results

Log ID	Sample Name	Date Received	Analysis Time	Simazine Amount (ng/sample)
1	WB	01/04/99	01/14/99	25.5
2	WFS1	01/04/99	01/04/99	232
3	SB	01/04/99	01/14/99	26.7
4	SFS2	01/04/99	01/14/99	219
5	EB	01/04/99	01/14/99	36.8
6	EFS3	01/04/99	01/14/99	244
7	NB	01/04/99	01/14/99	20.9
8	NFS4	01/04/99	01/14/99	245
9	W1	01/04/99	01/14/99	Bkg
10	S1	01/04/99	01/14/99	Det*
11	S1D	01/04/99	01/14/99	Det
12	E1	01/04/99	01/14/99	47.1
13	N1	01/04/99	01/14/99	Bkg
14	E2	01/04/99	01/14/99	31.9
15	N2	01/04/99	01/14/99	Bkg
16	W2	01/04/99	01/14/99	Det
17	S2	01/04/99	01/15/99	Det
18	S2D	01/04/99	01/15/99	Bkg
19	E3	01/04/99	01/19/99	Det
20	N3	01/04/99	01/19/99	Bkg*
21	W3	01/04/99	01/19/99	Bkg
22	S3	01/04/99	01/19/99	Bkg *
23	S3D	01/04/99	01/19/99	Bkg
24	E4	01/04/99	01/19/99	Det
25	N4	01/04/99	01/19/99	Det
26	W4	01/04/99	01/19/99	Bkg
27	S4	01/04/99	01/19/99	Det
28	S4D	01/04/99	01/19/99	20.7
29	N5	01/04/99	01/19/99	Det
30	E5	01/04/99	01/19/99	Det
31	W5	01/04/99	01/19/99	Det
32	S5	01/04/99	01/19/99	Det
33	S5D	01/04/99	01/19/99	Det
34	E6	01/04/99	01/19/99	Det
35	N6	01/04/99	01/19/99	Det
36	W6	01/04/99	01/19/99	Bkg
37	S6	01/04/99	01/20/99	Det*

Log ID	Sample Name	Date Received	Analysis Time	Simazine Amount (ng/sample)
38	S6D	01/04/99	01/20/99	Det
39	E7	01/04/99	01/20/99	Bkg
40	N7	01/04/99	01/20/99	Bkg
41	W7	01/04/99	01/20/99	20.6
42	S7	01/04/99	01/20/99	Bkg
43	S7D	01/04/99	01/20/99	Det
44	E8	01/04/99	01/20/99	27.5
45	W8	01/04/99	01/20/99	20.7
46	N8	01/04/99	01/20/99	25.9
47	S8	01/04/99	01/20/99	Det
48	S8D	01/04/99	01/20/99	20.2
49	TS1	01/04/99	01/20/99	206
50	TS2	01/04/99	01/20/99	207
51	TS3	01/04/99	01/20/99	210
52	TS4	01/04/99	01/20/99	221*
53	TB	01/04/99	01/20/99	Bkg
	LS1	12/13/98	01/20/99	233
	LS2	12/13/98	01/20/99	231
	LS3	12/13/98	01/20/99	236
	LS4	12/13/98	01/20/99	235

*Average of two analyses
MDL = < 3.8 ng/sample
BKG = Amount >3.8 ng/sample and <9.6 ng/sample
Det = Simazine amount ≥9.6 ng/sample (BKG) and <18.2 ng/sample (EQL).

7.0 Simazine Application Analytical Quality Control

Two laboratory control spikes and a laboratory control blank were prepared with each batch of samples. A laboratory solvent blank was run and a multi-point calibration or mid-point calibration and calibration check was performed prior to the analysis of a sample set. Calibration check samples and duplicate sample analyses were run during the analysis of a sample set. Additional QC included field spikes, trip spikes, laboratory spikes, and trip blanks. A summary of the QC results is given in this section.

7.1 Mass spectrometer tune

The mass spectrometer was manually tuned prior to the analysis of a batch of samples Tune parameters are given in the simazine SOP (Attachment 1).

7.2 Laboratory solvent blanks

A laboratory solvent blank was analyzed prior to the analysis of a sample batch. Four batches of ambient simazine samples were analyzed. Table 11 provides the results of the laboratory solvent blanks for the four sample batches. Background levels of simazine were detected in all the laboratory solvent blanks. The background was probably due to impurities in the internal standard or interfering ions from the internal standard. The average blank level was 1.2 pg/ul, which was near the method detection level. To distinguish actual simazine levels from background levels 3 times the standard deviation of the seven laboratory blanks was added to the average blank level. This corresponded to a level of 3.8 pg/ul. Levels between 3.8 pg/ul and the EQL were reported as detected (det). Levels above the EQL of 18.2 ng/sample was reported as the actual measured value.

Table 11. Laboratory solvent blanks

Sample Name	Date	Simazine Amount (ng/sample)
B9901141	1/14/99	BKG[1]
B990119A	1/19/99	<MDL[2]
B990120	1/20/99	BKG

[1]BKG = Amount ≥3.8 ng/sample and <9.6 ng/sample
[2]<MDL = <3.8 ng/sample

7.3 Calibration.

A 5-point multi-point calibration was run prior to each batch of samples or a mid-point calibration and a mid-point calibration check was run prior to each batch of samples.

7.4 Laboratory control spikes

Two laboratory control spikes (LCS) were run prior to the analysis of each batch of samples. A LCS is a resin cartridge spiked with 250 ngs of simazine. The control sample is prepared and analyzed the same way as the samples. LCS recoveries ranged from 122%-123% and the relative difference between samples in the set was 0.306%. The results are presented in Table 12.

Table 12. Laboratory control spike results.

Sample Name	Date Analyzed	Simazine Amount (ng/sample)	Simazine Expected (ng/sample)	Percent Recovery	Relative difference
LC44	1/14/99	306	250	122%	
LC45	1/14/99	308	250	123%	0.612%

Relative Difference = 100*(sample1-sample2)/average

7.5 Laboratory control blanks

A single laboratory control blank (LCB) is run prior to the analysis of each sample batch. The LCB blank sample cartridge is prepared and analyzed the same way the samples are analyzed. The LCB results are presented in Table 13.

Table 13. Laboratory control blank results

Sample Name	Date Analyzed	Simazine Amount (ng/sample)
LB21	1/14/99	Bkg*

*Bkg = Amount $\geq$ 3.8 ng/sample and <9.6 ng/sample

7.6 Calibration check samples

Calibration check samples (CCS) are analyzed with each set of samples analyzed. A CCS is run after every tenth sample in a sample batch. CCS samples are run to ensure instrument drift does not exceed 20%. CCS sample results are given in Table 14. The average CCS percent recovery was 98.1% of the expected simazine amount with a relative standard deviation of 2.09%

Table 14. Calibration check sample results

Sample Name	Date Run	Simazine Amount (ng/sample)	Simazine Expected (ng/sample)	Percent Recovery
C9901401	1/14/99	126	125	101%
C9901402	1/14/99	124	125	99.0%
C9901901	1/19/99	124	125	99.0%
C9901902	1/20/99	124	125	99.3%
C9901903	1/20/99	121	125	96.4%
C902001	1/20/99	118	125	94.6%
C902002	1/21/99	122	125	97.7%

7.7 Duplicate analysis

Duplicate analysis is performed on every tenth sample in a sample analysis set. Results are given in Table 15. Relative difference was calculated on duplicate pairs when the values were at or higher than the EQL. For the one sample above the EQL the relative difference was 0.555%.

Table 15. Duplicate analysis results

Sample Name	Simazine Amount (ng/sample)	Average (ng/sample)	Relative Difference
S1-1	Det[1]		
S1-2	Det	NQ[2]	NC[3]
N3-1	Det		
N3-2	Det	NQ	NC
S6-1	Det		
S6-2	Det	NQ	NC
TS4-1	222		
TS4-2	220	221	0.555%

[1]Det=Amount ≥9.6 ng/sample and <18.2 ng/sample
[2]NQ=not quantitated
[3]NC=not calculated
Relative Difference = 100*(analysis1-analysis2)/average

8.0 Application field, trip, and laboratory spikes and trip blanks

Four laboratory spikes, four trip spikes and four field spikes were analyzed for the simazine application test.

8.1 Laboratory spikes

Four laboratory spikes were spiked with 200 ngs of simazine on 12/13/98 and stored in the Testing's Laboratory freezer at 0^0C until they were analyzed on 1/20-21/99. The laboratory spike results are given in Table 16. The average percent recovery was 117% and the relative standard deviation was 0.993%.

Table 16. Laboratory spikes results

Sample Name	Date Spiked	Date Analyzed	Simazine Amount (ng/sample)	Amount Simazine Spiked (ng/sample)	Percent Recovery
LS01	12/13/98	1/20/99	233	200	116%
LS02	12/13/98	1/20/99	231	200	116%
LS03	12/13/98	1/20/99	236	200	118%
LS04	12/13/98	1/21/99	235	200	118%

8.2 Trip spikes

Four trip spikes were spiked with 200 ngs of simazine on 12/13/98. Trip spikes were taken to the sampling site and returned to the laboratory along with the samples, which were analyzed on 1/20/99. The trip spike results are given in Table 17. The average recovery was 107% and the relative standard deviation was 3.45%.

Table 17. Trip spike results

Sample Name	Date Spiked	Date Analyzed	Simazine Amount (ng/sample)	Amount Simazine Spiked (ng/sample)	Percent Recovery
TS01	12/13/988	1/20/99	206	200	103%
TS02	12/13/988	1/20/99	207	200	104%
TS03	12/13/988	1/20/99	210	200	105%
TS04	12/13/988	1/20/99	221	200	110%*

*Average of two analyses.

8.3 Field spikes

A series of 4 field spikes were spiked with 200 ngs of Simazine on 12/13/98. Field spikes were taken to the sampling site and ambient air was sampled through the field spikes. A collocated sample was taken concurrently with the each field spike. The field spikes were returned to the laboratory along with a the samples. The field spike results are given in Table 18. The average recovery of the field spikes was 104% with a relative standard deviation of 6.31%.

Table 18. Field spike results

Sample Name	Collocated blank	Date Analyzed	Simazine Amount in Sample (ng/sample)	Amount Simazine in collocated sample (ng/sample)	Percent Recovery
WFS1	WB	1/14/99	232	25.5	103%
SFS2	SB	1/14/99	219	26.7	96.1%
EFS3	EB	1/14/99	243	36.8	104%
NFS4	NB	1/14/99	245	20.9	112%

8.4 Trip blanks

One application trip blank, TB, was analyzed on 1/20/99. Simazine was detected in the blank at a background level.

8.5 Backup resin analysis.

The backup resin beds of five ambient samples with the highest ambient simazine levels were analyzed for breakthrough. No simazine was above background in any of the backup resin beds. The results are given in Table 19.

Table 19. Blank resin results

Sample Name	Simazine Amount (ng/sample)
FOW07	Bkg
CHW07	Bkg
CHW12	Bkg
FOW13D	Bkg
CHW15	Bkg

*Bkg = Amount $\geq$3.8 ng/sample but < 9.6 ng/sample

10. Simazine Chromatograms and Extracted Ion Profiles

Figure 1. Extracted ion profile of a simazine standard at 10 pg/ul at 7.1 times the method detection limit of 1.4 pg/ul.

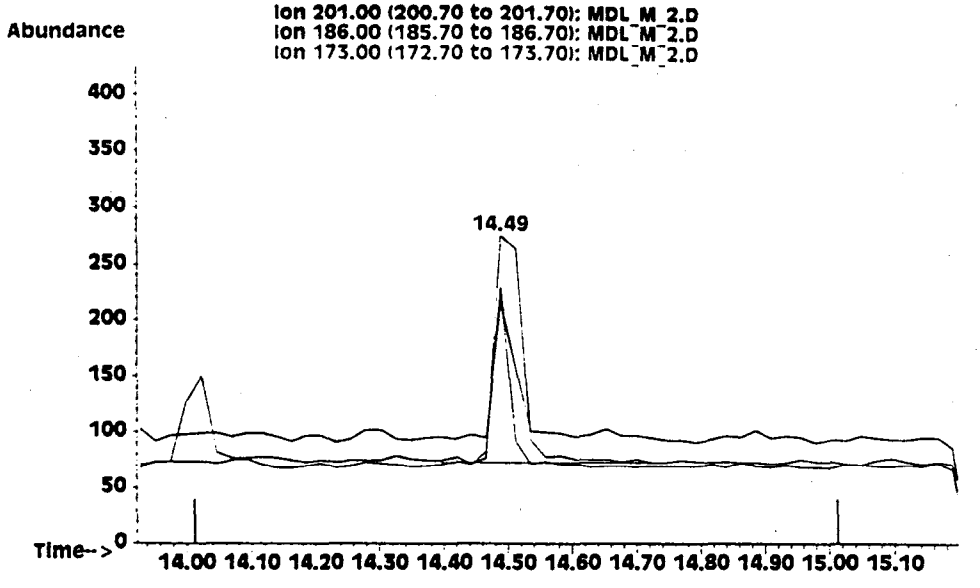


Figure 2. Total ion chromatogram of a ambient field spike sample FS01 spiked at 25 pg/ul. The retention time of simazine is 14.2 minutes.

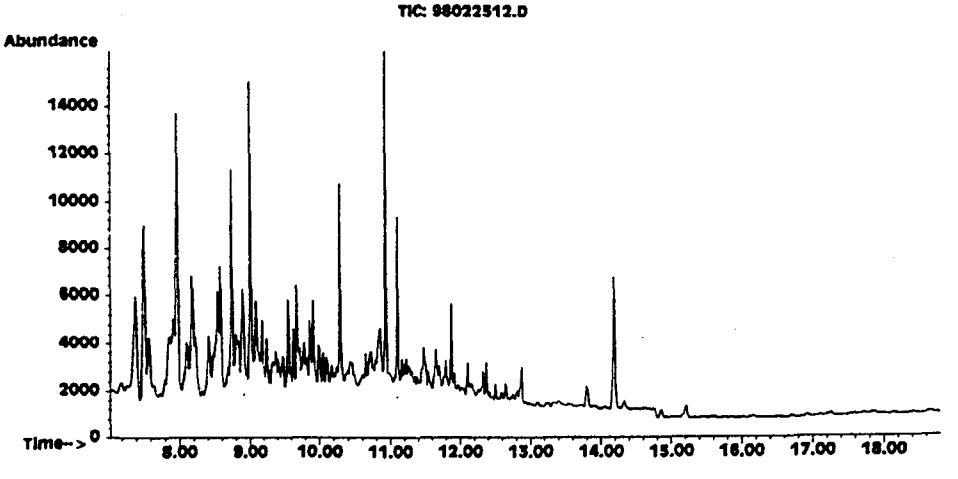


Figure 3. Extracted ion profile of XAD resin blank. Simazine at a concentration near the detection level was detected. The background simazine was probably due to impurities in the internal standard.

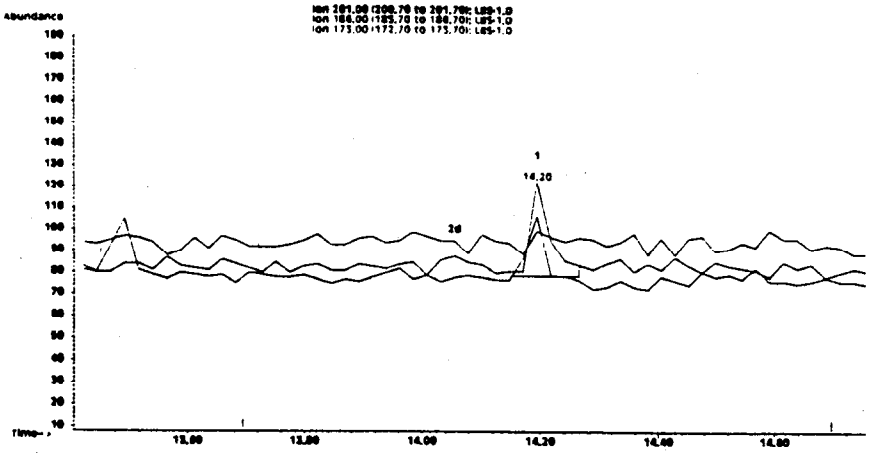
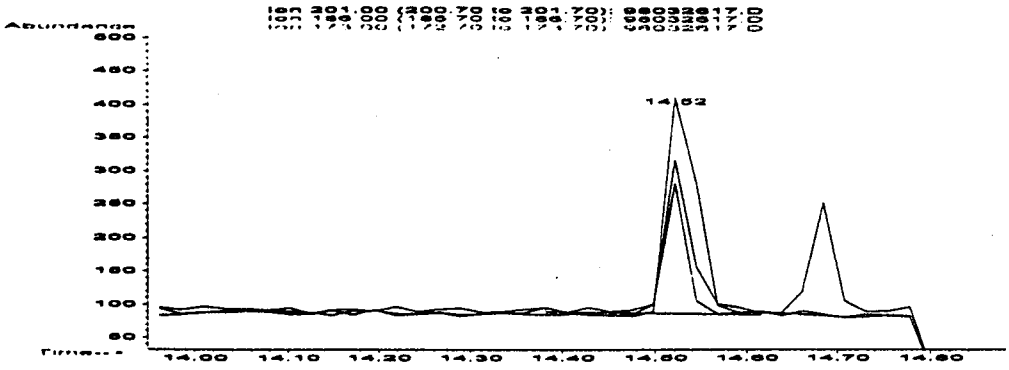


Figure 4. Shown below is sample PAR06 extracted ion profile of ions with m/e of 201, 186 and 173. Simazine peak is at 14.52 minutes and the simazine concentration is at 30.8 pg/ul.



*Simazine retention times for samples in batch are within .01 minutes of each other. Simazine retention times for samples run in different batches vary due to varying column length and a preset linear velocity. Normal column maintenance requires that periodically the front end of the column be clipped off to restore the quality of the chromatography.

Attachment 1

Standard Operating Procedure for the Sampling and Analysis of Simazine in the Ambient Air.

State of California
Air Resources Board
Monitoring and Laboratory Division/ELB

Standard Operating Procedure for the Sampling and Analysis of Simazine in Ambient Air
2/26/98 Version

Analyst: Ken Kiefer and R. Okamoto
Reviewed by: R. Okamoto
Kevin Mongar

1. SCOPE

This is a sorbent tube, solvent extraction, gas chromatography/mass spectrometry method for the determination of simazine from ambient air samples.

2. SUMMARY OF METHOD

The exposed XAD-2 resin tubes (SKC #226-30-06) are stored in an ice chest on dry ice or freezer until desorbed during sonication into 2.5 ml of ethyl acetate. The sorbent is spiked with 500ng of Simazine-$^{13}C_3$ prior to extraction. The splitless injection volume is 4 ul. A gas chromatograph with a DB-17MS capillary column and a quadrapole mass spectrometer (MS) is used for analysis. The MS detector is operated in selected ion monitoring mode.

3. INTERFERENCES/LIMITATIONS

Method interferences may be caused by contaminants in solvents, reagents, glassware and other processing apparatus that can lead to discrete artifacts or elevated baselines. Co-eluting compounds trapped during sample collection may also interfere. A method blank must be done with each batch of samples to detect any possible method interferences.

4. EQUIPMENT AND CONDITIONS

A. INSTRUMENTATION:

Hewlett Packard 5890 chromatograph
Hewlett Packard 5971A mass selective detector
Hewlett Packard 8200 Autosampler

Detector: 280°C
Injector: 250°C
Injector Liner: Double goose neck liner with glass wool

Column: J&W Scientific DB-17MS, 30 meter, 0.25 mm i.d., 0.25 um film thickness.

Pre-column: J&W Scientific deactivated fused silica, 2 meter, 0.32 mm i.d.
GC Temp. Program: Initial 50°C, hold 5 min., to 220°C @ 25°C/min., hold 2 min., to 280°C @ 5°C/min., hold 1 min.
Injector:

Pressure Pulse: Initial 6.4 psi, to 40 psi @ 99 psi/min, hold 1.31 min, to 6.4 psi @ 99 psi/min
Splitless: Purge on 2 min.
Carrier Gas: Helium
Column: Linear velocity: 32 cm/sec, electronic pressure control (6.4 psi @ 50 °C).

Auto Sampler:

Sample washes - 1, Sample pumps - 4, Sample Volume - 4 stops, Viscosity delay - 0 sec, Solvent A washes - 4, Solvent B washes - 4

Mass Spectrometer:

Electron Ionization
Selective Ion Monitoring; Simazine - 201 (quant. ion, 100%), 186 (qual. ion, 45%), 173 (qual. ion, 19%). Simazine-$^{13}C_3$ - 204 (quant. ion, 100%), 70 (qual. ion, 140%), 185 (qual. Ion, 95%)
Tuning: PFTBA

B. AUXILIARY APPARATUS:

1. Glass amber vials, 8 mL capacity.
2. Vial Shaker, SKC, or equiv.
3. Sonicator, Branson 2210
4. Autosampler vials with septum caps.

C. REAGENTS

1. Ethyl Acetate, Pesticide Grade, or better
2. Simazine 99% pure or better (e.g., from Chem Service).
3. Simazine $^{13}C_3$ 99% pure or better (e.g., from Cambridge Isotope Laboratories)

5. ANALYSIS OF SAMPLES

1. A daily manual tune shall be performed using PFTBA. The instrument is tuned using masses - 69, 219, 502. The criterion for the tune are the peak widths at 1/2 the peak height, 0.50 $\pm$ .05, and the criteria for relative abundance; 69:100%; 219:60%-70%, and 502:2%-5%.

2. It is necessary to analyze a solvent blank with each batch of samples. The blank must be free of interferences. A solvent blank must be analyzed after any sample, which results in possible carry-over contamination.

3. A 5 point calibration curve shall be analyzed with each batch of samples. A single point calibration check at the midpoint of the calibration curve may be substituted for the 5 point calibration curve provided that it is within 20% of the average response factor from an initial 5 point multi-point calibration curve and the calibration updated. Then a second midpoint calibration standard is run. If both midpoint calibrations are within 20% of each other then the analysis of the batch of samples can proceed.

4. With each batch of samples a laboratory blank and two laboratory control spike samples will be run with each batch of samples. A laboratory blank is a blank resin cartridge prepared and analyzed the same way the samples are analyzed. A laboratory control spike is a resin cartridge spiked with a known amount of standard. The control sample is prepared and analyzed the same way as the samples. Laboratory check samples need to be within 40% (100*difference/average) of each other and have recoveries that are +/-30% of the theoretical spiked value.

5. At least one calibration check sample must be analyzed for each set of samples analyzed. The response of the standard must be within 20% of the initial calibration analyses for the batch. If the calibration check is outside the limit then those samples in the batch after the last calibration check that was within the 20% limit need to be reanalyzed.

6. Carefully score the secondary section end of the sampled XAD-2 tube above the glasswool and break at the score. Remove the glass wool plug from the secondary end of the XAD-2 tube with forceps and place it into a 4 mL amber colored sample vial. Pour the backup portion of the XAD-2 into the same vial. Spike the back end of the primary XAD with 12.5 ul of 20 ng/ml Simazine $^{13}C_3$. Let the solvent evaporate for approximately 10 minutes. Remove the middle glass wool plug and store in the 4 mls amber vial. Retain the secondary section of the XAD-2 tube for later analysis if needed to check the possibility of breakthrough.

7. Pour the primary XAD into a 8 ml vial. Remove the glasswool plug from the tube and put into the 8 ml vial. Rinse the tube with 2.5 mls of ethyl acetate and pour the rinse into the 8 ml vial.

8. Place the sample vial on a desorption shaker (or ultra sonic water-bath) for 30 minutes. Remove vial and store at -20°C until analysis. Prior to analysis transfer an aliquot to a GC autosample vial.

9. After calibration of the GC system, inject 4.0 ul of the extract. If the resultant peak for simazine has a measured concentration greater than that of the highest standard injected, dilute the sample and re-inject.

10. Calculate the concentration in ng/mL based on the data system calibration response factors. If the sample has been diluted, multiply the calculated concentration by the dilution factor.

11. The atmospheric concentration is calculated according to:

    Conc., ng/m^3 = (Extract Conc., ng/mL X 2.5 mL) / Air Volume Sampled, m^3

6. QUALITY ASSURANCE

A. INSTRUMENT REPRODUCIBILITY

Five injections of 4 ul each were made of simazine standards at three concentrations in order to establish the reproducibility of this instrument. This data (Testing Section lab, 12/12/98) is shown in Table 1.

TABLE 1. Instrument Reproducibility

Simazine-$^{13}C_3$ Amt. (ng/ml)	Simazine-$^{13}C_3$ Response	Simazine Amt. (ng/ml)	Simazine Response	Amt. Ratio	Resp Ratio	Response Ratio RSD
100	5425	12.5	670	.125	.124	
100	5110	12.5	734	.125	.144	
100	4672	12.5	646	.125	.138	
100	5327	12.5	838	.125	.157	
100	5316	12.5	757	.125	.142	8.65
100	5277	50	2547	.50	.480	
100	5938	50	2802	.50	.472	
100	5678	50	2805	.50	.494	
100	5917	50	2746	.50	.464	
100	5840	50	2747	.50	.470	2.42
100	5055	250	11546	2.5	2.28	
100	6330	250	14920	2.5	2.36	
100	5138	250	11603	2.5	2.26	
100	6173	250	14314	2.5	2.32	
100	6359	250	14953	2.5	2.35	1.87

B. CALIBRATION

Linearity

A linear regression was performed on a 12.5 pg/ul-200pg/ul 5-point calibration curve made on 12/11/97.

Resp Ratio = (.942)*Amt + .00977

$R^2 = 1.000$

Initial Calibration

A five-point calibration curve was made on 12/11/97. The calibration range was 250 ng/mL to 12.5 ng/mL simazine. The corresponding response factor linear regression equation is:

Response Ratio = (9.85×10^{-1})*(Amount Ratio) RF Rel. Std. Dev. =7.0%

where:

Response Ratio = (Simazine response)/(Simazine-$^{13}C_3$ response)

Amount Ratio = (Simazine concentration)/(Simazine-$^{13}C_3$ concentration)

A calibration check sample is run after every tenth sample in a batch to verify the system is still in calibration. Calibration check samples must be within 20% of the assigned value. If the check sample is outside that range then the ten samples within that sample batch will be rerun.

C. MINIMUM DETECTION LIMIT

Detection Limit is based on USEPA MDL calculation. Using the analysis of seven replicates of a low level matrix spikes, the method detection limit (MDL), and the estimated quantitation limit (EQL) for simazine were calculated by:

MDL = 3.14*s

EQL = 5*MDL

where:

s = the standard deviation of the concentration calculated for the seven replicate spikes.

Given s =0.46 for the seven samples, the MDL and EQL are calculated as follows.

MDL = 3.14 *.46 =1 (1.45) pg/ul
EQL= 5 *1.45 =7.23 pg/ul

Based on the 2.5 mL extraction volume and assuming a sample volume of 4.32 m^3 (3 lpm for 24 hours) the EQL for ambient concentration of simazine is:

(7.23 ng/mL)(2.5 mL) / (4.32 m^3) =4.18 ng/m^3 per 24-hour sample

If the internal standard simazine-$^{13}C_3$ is spiked in the sample at a high level, then the simazine impurity in the simazine-$^{13}C_3$ internal standard can be higher than the detection limit of the method. For example 140 pg/ul of 99% pure simazine-$^{13}C_3$ contains 1.4 pg/ul of simazine which is the same level as the method detection limit. To distinguish the simazine background level from simazine in the sample the following procedure is followed. Seven replicate blank samples with only the internal standard are analyzed. The average blank level is determined and added to three times the standard deviation of the replicate blanks (BKG+3s). Sample values between the MDL and BKG + 3s cannot be distinguished from simazine impurity of the internal standard. Values above BKG+3s are considered real and are not attributed to the blank. .

Results are reported to 3 significant figures above the EQL. Results below EQL but greater than or equal to BKG +3s are reported as detected (det). Results below BKG +3s but greater than or equal to MDL are reported as BKG. Results less than MDL are reported as <MDL.

D. COLLECTION AND EXTRACTION EFFICIENCY (RECOVERY)

62.5 ng of simazine standard was spiked on the primary section of each of six XAD-2 sampling tubes. The spiked tubes were then subjected to an airflow of 3 lpm for 24 hours. The samplers were set-up at 13th and T St. (Sacramento) at an ambient temperature of approximately 30°C (maximum). The primary sections were extracted with ethyl acetate and the extracts were stored in the freezer until analyzed. Percent recoveries of simazine from primary sections of three tubes analyzed within one week of sampling were 82.3%, 86.2%, 87.9% with an average of 85.5% and the percent recoveries of three tubes analyzed within two weeks of sampling were 73.2%, 80.4%, and 74.3% with an average of 75.9%.

E. STORAGE STABILITY

Storage stability studies were conducted over a 4 week period. The primary sections of 19 tubes were spiked with 62.5 ng of simazine. The spiked tubes were stored in the freezer

at -20°C and extracted/analyzed on storage weeks 1, 2, 3 and 4. Four tubes each was analyzed on week 1 and 5 tubes each were analyzed on weeks 2, 3, and 4. The storage recoveries (average results) were 104%, 92.6%, 83.7% and 99.8% for weeks 1, 2, 3 and 4 respectively.

A second set of tubes were spiked with 1250 ngs of simazine. The spiked tubes were stored in the freezer at -20°C and extracted/analyzed on storage weeks 1, 3 and 4. Five tubes each were analyzed on week 1, 3, and 4. The storage recoveries (average results) were 91.3%, 83.2%, and 82.0% for weeks 1, 3, and 4 respectively.

F. BREAKTHROUGH

The primary sections of four tubes were spiked with 750 ng simazine/tube then run for 24 hours at 3 lpm (see Section D above). No simazine was detected in the back-up resin bed of any of the tubes.

G. SAFETY

Simazine is highly toxic if inhaled, moderately toxic if ingested, and slightly toxic via dermal exposure. The LD_{50} ranges is >5,000 mg/kg/day for rats. The 4-hour inhalation LC50 in rates is 2 mg/m^3. EPA has classified simazine as a possible human carcinogen because it may have caused cancer in test animals, which received high dose over the course of their lifetimes.

APPENDIX III

PESTICIDE USE REPORT

Allen Wild P/O

LEFFINGWELL AG SALES CO., INC.

32889 RD 159 IVANHOE CA 93235 (209) 798-1153

PEST CONTROL RECOMMENDATION # 310199

GROWER: GERMAN "3" RANCH
P.O.BOX 4411
VISALIA CA 93278
(209) 592-2996 (B)
(209) 592-5840 (R)
RANCH: HOME
BLOCK'S: NAVS

DATE: 11/24/98
PROPOSED: 11/30/98

ACRES: 30.00
GPA: 50.00
TANKS: 6.00
SPRAYER: LOVE
APPLICATION: DILUTE
MAX.GROUND SPEED:

LOC: ALL ORANGE GROUND SOLID
CROP: ORANGES

PEST: WEEDS

Map:	Site ID:	Avenue:	Road:	Qd:	Sec:	Town:	Range:	BM:
01	1-101	304	182	SE	28	18S	26E	M

MATERIALS	EPA #	RATE PER ACRE	AMOUNT PER 250	TOTAL MATERIAL
CALIBER 90	100-603	4.00 LB	20.00 LB	120.00 LB
DIREX DF	19713-274	3.00 LB	15.00 LB	90.00 LB
ROUNDUP ULTR	524-475	3.00 PT	1.88 GL	11.25 GL
TRI-AD 73	1050990-50011AA	.80 PT	2.00 QT	3.00 GL

COMMENTS :DON'T APPLY ADJACENT TO OAK TREES AS DAMAGE MAY OCCUR
CALIBER 90 :CALBER 90- Do not apply to water or wetlands.Users of this product are advised not to apply simazine where the water table is close to the surface and where the soils are very permeable,i.e., well drained soils such as loamy sands.Simazine is a chemical which can travel through soil and enter ground water.Users are advised to consult with their local ag. agencies to obtain information on the location of ground water and the type of soil in their area.
ROUNDUP ULTR:ROUNDUP ULTRA: DO NOT APPLY DIRECTLY TO WATER OR WETLANDS !!!!!
AVOID CONTACT WITH FRUIT &/OR FOLIAGE !!!!!

Permit Required : YES # 54-98-5404170
NOI Required : NO
Bee Notification : NO
Days to Reentry : 2
Days to Harvest : 1

--ORCHARD MAP--

PASTURE	PASTURE	PASTURE
PASTURE	TARGET	PASTURE
OPEN	OPEN	OPEN

Do NOT apply when weather conditions favor drift.
Reason for treatment - Pests are present.
Reason for treatment - Pests are known to occur.

I certify that alternatives and mitigation measures that would substantially lessen any significant adverse impact on the environment have been considered and if feasible, adopted.
WARNING! THIS RECOMMENDATION IS VOID IF NOT FOLLOWED AS DIRECTED.

PCA signature Bob Felts BOB FELTS PCA License # 6400

STATE OF CALIFORNIA
DEPARTMENT OF PESTICIDE REGULATION
PESTICIDE USE REPORT

CDPR 33-025

MONTH: DECEMBER 1998
[ ] Nursery

Printed 12/20/98
Appl #: 2926

Cty	Sec	Twn	Rng	B&M	Mth	Operator
54	28	18	26	M	GRD	GERMAN "S" RANCH

Applicator
05328
LOVE'S FARM MGT.
17710 AVENUE 304
VISALIA CA

Operator#
54-98-5404170

Site#
1-101

Total Planted
Acres: 30

Location
S/E AVE 304 & LORT DR

Block
51

Date/Time Completed
12/19/98 1600

Total Acres
Treated: 30

Commodity Treated
ORANGE

Manufacturer	Product	EPA Registration#	Tot Product	Rate	Dilution Volume
RHA	TRI-AD 73	1050990-50011AA	3.00 GA	0.80 PT/ACRE	50.00
MONSANTO	ROUNDUP ULTRA	524-475	11.25 GA	3.00 PT/ACRE	50.00
GRIFFIN	DIREX 80DF	352-508-1812	90.00 LB	3.00 LB/ACRE	50.00
NOVARTIS	PRINCEP CAL 90	100-593	120.00 LB	4.00 LB/ACRE	50.00

Reentry
Days:1

Preharvest
Days: 1

Supervisor
ALLEN LOVE 35454

CHEMTRAK(tm)

APPENDIX IV

DPR's
AIR MONITORING RECOMMEDATIONS FOR SIMAZINE

State of California

Memorandum

To: George Lew, Chief
Engineering and Laboratory Branch
Monitoring and Laboratory Division
Air Resources Board
600 North Market Boulevard
Sacramento, California 95812

Date: August 28, 1997

From: **Department of Pesticide Regulation** - 1020 N Street, Room 161
Sacramento, California 95814-5624

Subject: AIR MONITORING RECOMMENDATION FOR SIMAZINE

Attached is the Department of Pesticide Regulation's (DPR) recommendation for monitoring the pesticide simazine. DPR provides this recommendation pursuant to the requirements of Assembly Bill 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5). DPR bases its air monitoring recommendations on historical simazine use information. Therefore, we request that you consult with the agricultural commissioner in the county where air monitoring will be conducted to select appropriate sites.

We anticipate submission of air monitoring data by February 1999.

If you have any questions please contact Pam Wales, of my staff, at (916) 322-3877.

John S. Sanders, Ph.D., Chief
Environmental Monitoring and
Pest Management Branch
(916) 324-4100

Attachment

cc: Cosmo C. Insalaco, Agricultural Commissioner Fresno County (w/attachment)
W. Earl McPhail, Agricultual Commissioner Ventura County (w/attachment)
Daniel J. Merkley, DPR (w/attachment)
Lynn Baker, ARB (w/attachment)
Cindy Castronovo, ARB (w/attachment)
Raymond Menebroker, ARB (w/attachment)
Kevin Mongar, ARB (w/attachment)
Charles M. Andrews, DPR (w/attachment)
Barry Cortez, DPR (w/attachment)
John Donahue, DPR (w/attachment)
Gary Patterson, DPR (w/attachment)
Madeline Brattesani, DPR (w/attachment)
Pam Wales, DPR (w/attachment)
Kevin Kelley, DPR (w/attachment)

Staff Report

USE INFORMATION AND AIR MONITORING RECOMMENDATION FOR THE PESTICIDAL ACTIVE INGREDIENT SIMAZINE

August 1997

Principal Author

Kevin Kelley
Associate Environmental Research Scientist

State of California
Department of Pesticide Regulation
1020 N Street
Sacramento, California 95814-5624

USE INFORMATION AND AIR MONITORING RECOMMENDATION FOR THE PESTICIDAL ACTIVE INGREDIENT SIMAZINE

A. BACKGROUND

This recommendation contains general information regarding the physical-chemical properties and the historical trends in the use of 6-Chloro-N-N'-diethyl-1,3,5-triazine-2,4-diamine (simazine). The Department of Pesticide Regulation (DPR) provides this information to assist the Air Resources Board (ARB) in their selection of appropriate locations for conducting pesticide air monitoring operations.

Simazine (CAS: 122-34-9) exists as colorless to white crystalline solid. It has a molecular formula of $C_7H_{12}ClN_5$, formula weight of 201.66 g/mole, and specific density of 1.203 at 20/4°C. Simazine has a water solubility of 20 mg/L at 24°C, vapor pressure of 810 nPa at 20°C, and Henry's Constant of 6.4×10^{-9} atm · m³/mol at 20–24°C. Simazine is slightly soluble in organic solvents at 20°-25°C: chloroform (900 mg/L), methanol (400 mg/L), and ethyl ether (300 mg/L). The photolytic half–life of simazine on glass plates is 108.17 hours (absorptance $\lambda = 53.25$ nm, initial concentration 6.7 µg).

The half-life of simazine in soil depends on soil pH, soil water content and soil organic matter content. Under laboratory conditions, the average half–life of simazine is 75 days (Alva and Singh, 1991) ranging from 45 in Hatzenbühl soil (pH 4.8) to 100 days, Neuhofen soil (pH 6.5).

The acute oral LD_{50} of technical simazine has been reported to be greater than 5,000 mg/kg for rats (Ashton and Monaco, 1991); however, RTECS (1985) reports the acute oral LD_{50} to be 950 mg/kg. Simazine's LC_{50} (96 hour) is 90 mg/L for bluegill sunfish, and >100 mg/L for rainbow trout and crucian carp. Simazine entered the risk assessment process at DPR under the SB 950 (Birth Defect Prevention Act of 1984) based on potential combined oncogenic and chronic toxicity.

B. USE OF SIMAZINE

As of July 18, 1997, there were 19 simazine-containing products registered for use in California. Simazine is a triazine herbicide, widely used for weed control in both cropland and non-cropland sites, and for the control of algae in aquariums and ornamental fish ponds. The currently registered simazine-containing products include twelve products formulated for cropland or non-cropland weed control, and seven products formulated for algae control in aquariums and ornamental fish ponds. Agricultural products may contain from 4% to 90% active ingredient (AI); the Signal–Word for these products (from product labels) is "Caution". Simazine products formulated for aquarium-use contain from 0.6% AI to 20.0% AI, and also have the Signal–Word "Caution" on product labels. Simazine products are formulated as wettable powders, water dispersible granules, dry flowables, and liquids.

Simazine-containing products formulated for weed control in agricultural situations are restricted materials, and all use (pounds of product applied, acreage, date, commodity, etc.) must be reported to the county agricultural commissioner in the county where the product is applied. The agricultural commissioners forward this information to DPR for compilation and publication in the annual Pesticide Use Report (PUR). Simazine-containing products formulated for aquarium use are home-use products and are not restricted materials, so their uses are not recorded.

For purposes of this monitoring recommendation, information on the cropland and non-cropland use of simazine was collected, and is presented in Table 1. Use of simazine in cropland situations accounts for approximately 80% of all reported applications. Use of simazine in non-cropland situations accounts for the remaining 20% of applications . Also, simazine use in cropland situations is reported on a township/range/section basis, unlike simazine use in non-cropland situations, where applications are reported as total applications within the county. For these two reasons, this monitoring recommendation will be based solely on simazine use in cropland situations. Historical use rates when presented, were calculated by dividing the total pounds of simazine applied (as reported in the PUR) by the acres to which it was applied.

Table 1. Annual Cropland and Non-Cropland Use of Simazine (Pounds Active Ingredient) for 1992-1995.

USE	1992	1993	1994	1995
Cropland	749,823.4	773,590.4	711,284.7	676,860.7
Non-Cropland	192,353.9	236,800.6	186,302.7	165,850.8
Total AI Applied	942,177.3	1,010,391.0	897,587.4	842,711.5
% Cropland Use	80%	77%	79%	80%
% Non-Cropland Use	20%	23%	21%	20%

Simazine is a selective, residual herbicide used for the control of many annual grasses and broadleaf weeds in cropland situations. Simazine application rates depend on soil type, soil organic matter, and the weed species targeted. Since few herbicides are effective for control of all weed species present, simazine is routinely admixed with other herbicides and applied as a tank mix. Simazine is a soil-applied herbicide, with applications made either before planting, at cultivation before or after crop emergence, and in some situations, following harvest. Simazine is soil incorporated immediately following application; simazine may be applied by chemigation.

According to the PUR, approximately 90% of all the simazine applied for weed control in agricultural settings occurs in fourteen counties (Table 2). Simazine is registered for use in a variety of agricultural plantings such as alfalfa, artichoke, blueberries, cranberries, corn, grapes, citrus, stonefruit and nut crop orchards. In annual agricultural plantings, simazine may be applied as a pre-plant herbicide, for the control of weed pests. In permanent agricultural settings such as vineyards, orchards, and berry-producing croplands, simazine is generally applied to berms, and/or as strip applications to orchard floors between producing trees and vines. Most agricultural applications of simazine occur in Fresno, Kern, and Tulare counties. Lesser yet significant amounts are applied in San Joaquin, Madera, and Stanislaus counties. Although comparatively little simazine is applied in Ventura County, it is used in avocado, lemon, and orange groves at much higher application rates; rates approaching 5.5 lbs AI/acre. Simazine is applied throughout the year.

Table 2. Annual Cropland Use of Simazine (Pounds of Active Ingredient)

County	1995	1994	1993	1992
Butte	9,047.1	10,625.0	11,754.9	12,272.8
Fresno	137,696.8	151,890.3	171,460.8	171,987.4
Kern	73,034.9	77,974.0	66,129.7	57,805.1
Madera	42,384.7	41,031.6	48,750.9	44,442.5
Merced	17,215.3	18,628.3	27,456.6	17,822.1
Monterey	16,080.9	14,717.7	15,236.9	14,750.2
Napa	10,651.0	12,961.5	27,753.6	19,813.0
Riverside	16,148.4	17,277.9	18,002.0	20,813.9
San Joaquin	45,786.2	58,836.5	49,169.4	50,469.6
Santa Barbara	11,994.8	17,182.9	8,042.2	11,494.6
Sonoma	18,913.5	18,382.1	27,310.4	23,978.0
Stanislaus	29,972.2	31,280.4	32,667.7	48,146.7
Tulare	169,196.3	158,682.6	173,169.0	151,144.0
Ventura	15,130.0	24,227.9	27,838.6	27,517.8
County Totals	613,252.1	653,698.7	704,742.7	672,457.7
Percent of Total	90.6%	91.9%	91.1%	89.7%
CALIFORNIA TOTAL	676,850.7	711,284.7	773,590.4	749,823.4

In Fresno County, simazine is applied for weed control in established vineyards and orchards (citrus and stone fruits). Simazine applications average 0.9 lbs AI/acre, ranging from 0.4 to 3.0 lbs AI/acre. Simazine use (total lbs AI applied/day) begins to rise in January, peaks in February and March, and declines dramatically in April (Table 3). In general, simazine applications segregate into two broad peaks; the first occurs in early-mid February, and tapers off from mid through late February. The second peak begins in late February and extends through the third week of March. The averaged daily use of simazine from February 1 through March 31 is shown in Figure 1. During this time span, vineyards receive 84 percent of the total amount of simazine applied (February [84%:1995; 81%:1994; 91%:1993; and 79%:1992], March [83%:1995; 88%:1994; 83%:1993; and 80%:1992]. Simazine applications to all crops in Fresno County during February and March are shown in Figure 2 (1994 and 1995) and Figure 3 (1992 and 1993).

Table 3. Applications[1] of Simazine in Fresno County, January through April.

Month	1995		1994		1993		1992	
	Amount	Rate[2]	Amount	Rate[2]	Amount	Rate[2]	Amount	Rate[2]
January	9,305.5	0.7	15,094.9	0.9	7,402.7	0.9	13,253.1	0.8
February	65,371.6	0.8	55,945.4	0.9	70,722.0	1.3	50,508.5	0.9
March	29,467.4	0.9	40,262.7	0.9	50,431.7	0.9	70,038.9	1.2
April	8,376.4	1.1	5,608.2	0.9	11,931.2	1.2	7,368.1	0.9

[1] In pounds of active ingredient.
[2] Average rate (in pounds of active ingredient per acre) for month of use.

In Kern County, simazine is applied throughout the year, with the majority of applications occurring from November through February. Applications are made for the control of weeds in citrus, stone fruit, grape, almond and walnut-producing areas. In Tulare County, applications occur throughout the year with the majority of use occurring in November and December. Applications in Tulare County are made to established orchards (orange and other citrus fruits), at rates ranging from 0.6 to 2.4 lbs AI/acre Tulare County.

In Ventura County, simazine is applied throughout the year to control weeds in orchards. In November and December, significant applications are made at rates exceeding 4.0 lbs AI/acre.

FIGURE 3

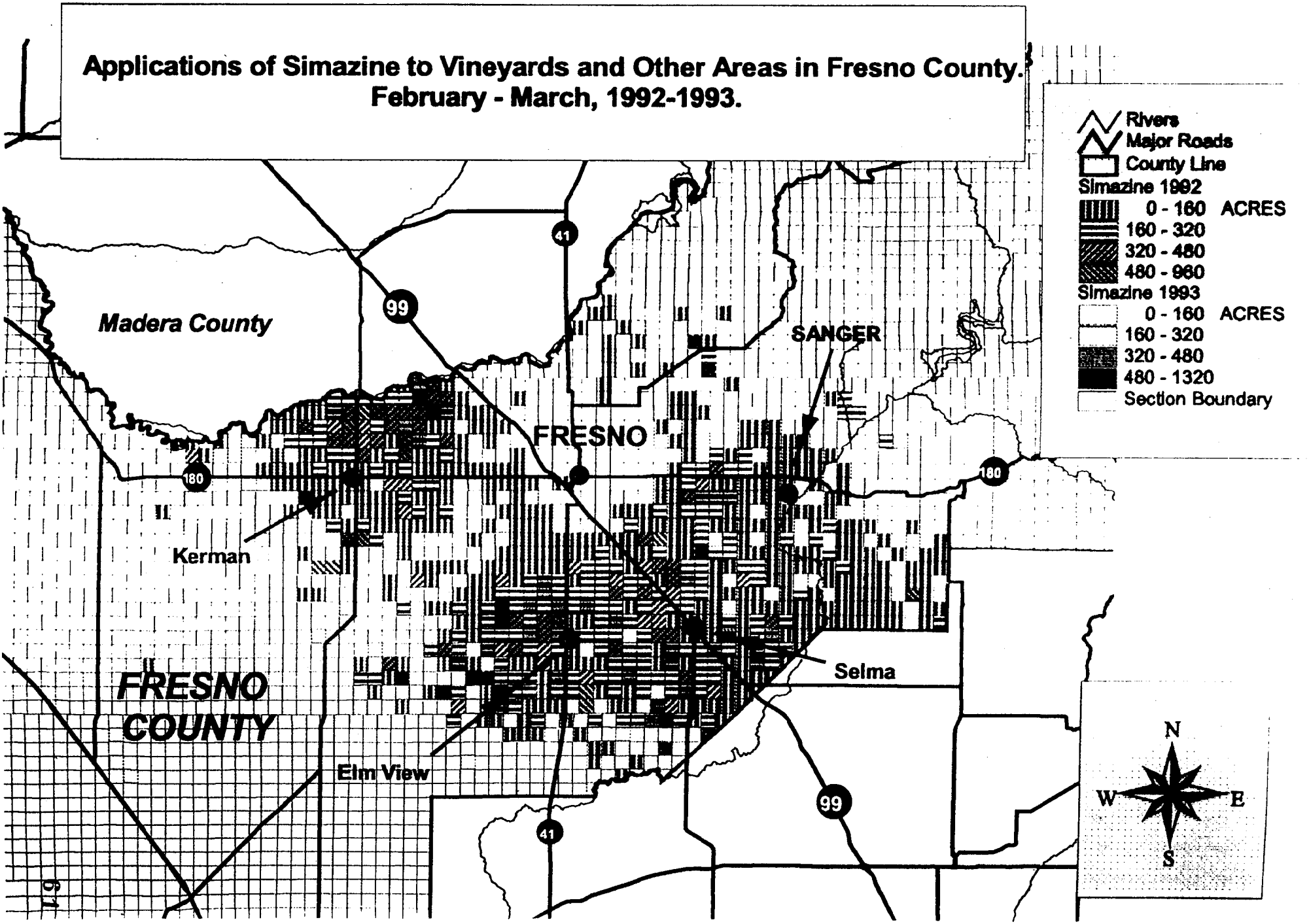

Applications of Simazine to Vineyards and Other Areas in Fresno County.
February - March, 1992-1993.
Rivers
Major Roads
County Line
Simazine 1992
0 - 160 ACRES
160 - 320
320 - 480
480 - 960
Simazine 1993
0 - 160 ACRES
160 - 320
320 - 480
480 - 1320
Section Boundary
Madera County
FRESNO
SANGER
Kerman
Selma
Elm View
FRESNO COUNTY
99
41
180
N
W
E
S

Table 4. Amount of Simazine Applied to Three Crops in Ventura County. November and December 1992 - 1995.

	November			December		
	Amount	Acres	Rate (Range)[1]	Amount	Acres	Rate (Range)1
1995						
Avocado	686.3	257.5	1.21 - 4.00	1,286.2	512.6	1.90 - 4.00
Lemon	839.3	272.5	0.60 - 4.40	2,424.2	1,434.2	0.71 - 4.00
Orange	542.0	198.3	2.47 - 3.60	777.1	247.5	0.80 - 4.00
1994						
Avocado	874.0	331.6	1.26 - 6.06	1,706.4	714.2	0.52 - 4.00
Lemon	3,068.1	1,044.1	1.64 - 4.00	6,182.4	1,704.5	1.33 - 4.00
Orange	1,075.3	312.0	1.80 - 7.71	1,404.7	373.1	2.70 - 4.28
1993						
Avocado	1,012.8	315.5	1.38 - 5.14	1,095.8	380.0	1.58 - 3.63
Lemon	3,713.2	1,141.3	1.94 - 4.11	2,807.2	935.2	1.20 - 4.00
Orange	2,531.2	730.2	2.44 - 5.71	2,082.9	671.5	1.00 - 4.09
1992						
Avocado	1,882.2	620.1	1.41 - 4.03	918.9	519.6	0.42 - 4.00
Lemon	1,603.8	553.75	0.90 - 4.05	5,485.4	1,484.8	0.90 - 5.21
Orange	1,031.3	322	2.06 - 4.00	2,178.7	602.0	1.06 - 5.14

[1] In pounds active ingredient per acre.

C. RECOMMENDATIONS

1. Ambient Air Monitoring

The historical trends in simazine use suggest that monitoring should occur over a 30- to 45-day sampling period in Fresno County from early February through late March, with the bulk of the sampling conducted during early-mid-March (see Figure 1). Since applications to grapes accounts for 85% of simazine applications during this time span, sampling sites should be located near grape-growing areas (Figure 2 and Figure 3). Three to five sampling sites should be selected in relatively high-population areas or in areas frequented by people. Ambient samples should not be collected from samplers immediately adjacent to fields or orchards where simazine is being applied. At each site, twenty to thirty discrete 24-hour samples should be taken during the sampling period. Background samples should be collected in an area distant to simazine applications.

Replicate (collocated) samples are needed for five dates at each sampling location. Two collocated samplers (in addition to the primary sampler) should be run on those days. The dates chosen for replicate samples should be distributed over the entire sampling period. They may, but need not be, the same dates at every site. Trip blank and field spike samples should be collected at the same environmental conditions (e.g., temperature, humidity, exposure to sunlight) and experimental conditions (e.g., air flow rates) as those occurring at the time of ambient sampling.

2. *Application-Site Air Monitoring*

The historical trends in simazine use (Table 4) suggest that application-site air monitoring should be conducted in Ventura County in areas associated with avocado, lemon, or orange groves during November or December (Figure 4 and Figure 5). Application rates range from 0.60 to 7.61 lbs AI/acre during this time span; the median rate is 4.0 lbs AI/Acre. Simazine is frequently applied at rates exceeding 4.0 lbs AI/acre. Therefore we suggest that monitoring be conducted during November or December and that monitoring be associated with application rates of 4.0 lbs AI/acre (or more). Although large amounts of simazine are not applied in Ventura County during these months, care should still be taken to ensure that nearby applications do not contaminate collected samples. If other simazine applications occur nearby during application-site sample collection, please note the location(s) and amount(s) of these applications.

A three-day monitoring period should be established with sampling times as follows: application + 1 hour, followed by one 2-hour sample, one 4-hour sample, two 8-hour samples and two 24-hour samples. A minimum of five samplers should be positioned, one on each side of the field, the fifth sampler should be collocated at one position. Background samplers should collect enough volume (either 12 hours at 15 liters/min, or a shorter period with a higher volume pump) to permit a reasonable minimum detection level. Ideally, samplers should be placed a minimum of 20 meters from the field, however, wherever samplers are placed, the distance from the field must be reported. Trip blanks and field spike samples should be collected at the same environmental conditions (temperature humidity, exposure to sunlight) and experimental conditions (similar air flow rates) as those occurring at the time of sampling.

Additionally, we request that you provide in the monitoring report: 1) an accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that the samplers are positioned from the field; 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, and other obstacles; 3) meteorological data collected at a minimum of 15-minute intervals including wind speed and direction, humidity, air temperature, and comments regarding degree of cloud cover; and 4) the elevation of each sampling station with respect to the field, and the orientation of the field with respect to north (identified as either true or magnetic north).

FIGURE 4

Simazine Applications to Avocado, Lemon, and Orange Groves.
November - December, 1994-1995.

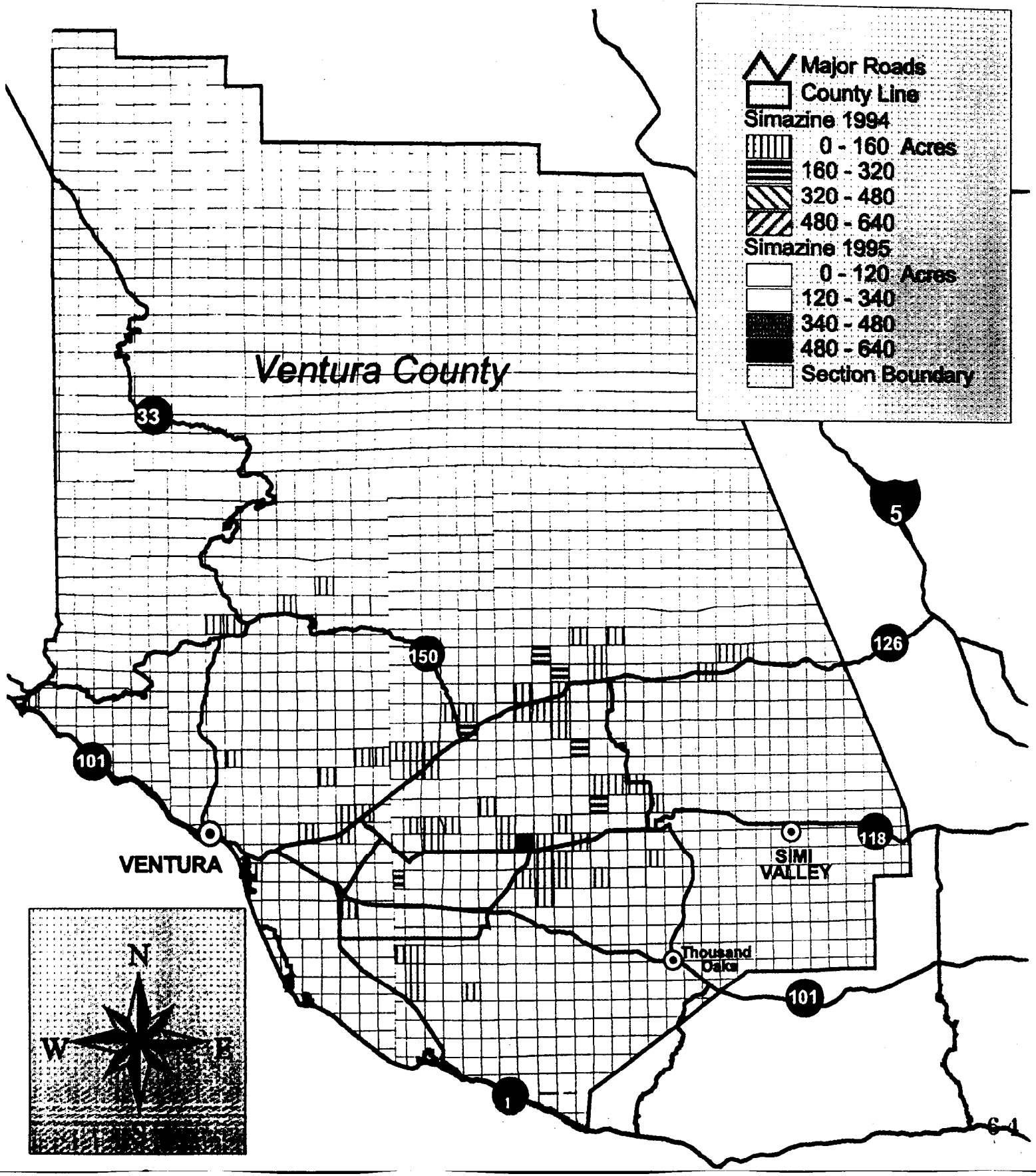
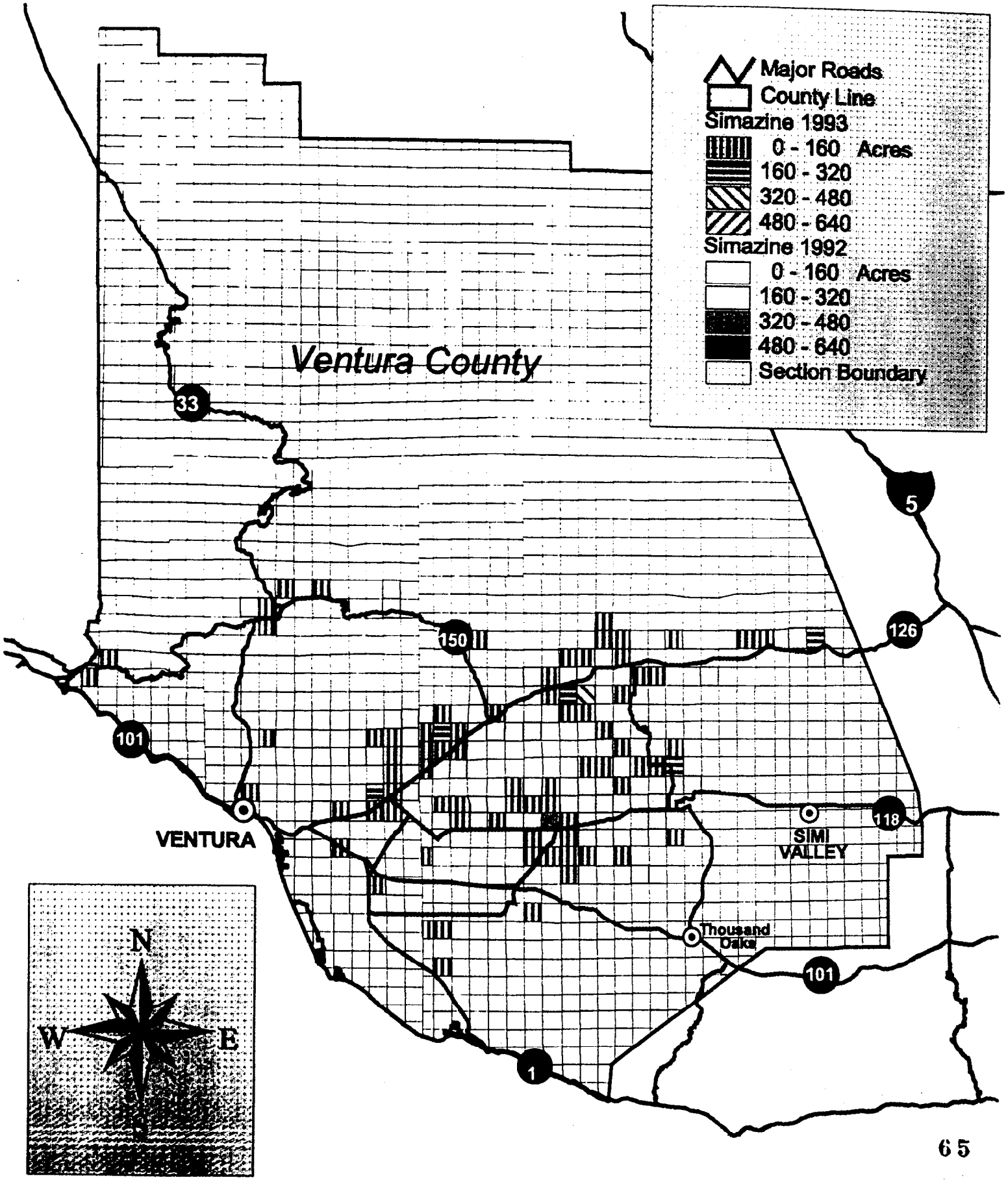


FIGURE 5

Simazine Applications to Avocado. Lemon, and Orange Groves.
November - December, 1992-1993.



D: Safety Considerations:

Simazine is a relatively non-toxic herbicide. However, care should still be taken during sample collection in the early stages of application-site monitoring. Simazine products require a 12 hour re-entry interval between application and when workers may enter treated fields. For workers entering fields before the expiration of the re-entry interval, personal protective equipment is required to be worn. Simazine labels recommend the use of coveralls, shoes plus socks, and waterproof gloves for those workers who will be entering fields before the expiration of the re-entry interval, in which plants, soil or water have been treated . Simazine products do not have buffer zones associated with any labeled uses. Monitoring personnel should refer to the label of the actual product used for further precautions.

E: General References:

Alva, A.K. and M. Singh. 1991. Sorption-desorption of herbicides in soils as influenced by electrolyte cations and ionic strength. J. Environ. Sci. Health, B26(2):147-163.

Ashton, F.M. and T.J. Monaco. 1991. Weed science:Principles and practices. 466 pages. John Wiley & Sons, Inc. New York.

Kelley, K.C. and N.R. Reed. 1996. Candidates for evaluation as toxic air contaminants. CDPR Report EH 96-01. California Department of Pesticide Regulation, Sacramento, California.

Montgomery, J.H. 1993. Agrochemicals Desk Reference: Environmental Data. 625 pages. Lewis Publishers, Chelsea, Michigan.

PUR. 1995. Pesticide Use Report. Department of Pesticide Regulation. Sacramento, California.

PUR. 1994. Pesticide Use Report. Department of Pesticide Regulation. Sacramento, California.

PUR. 1993. Pesticide Use Report. Department of Pesticide Regulation. Sacramento, California.

PUR. 1992. Pesticide Use Report. Department of Pesticide Regulation. Sacramento, California.

RTECS. 1985. Registry of toxic effects of chemical substances. U.S. Department of Health and Human Services. National Institute for Occupational Safety and Health. Washington, DC.

APPENDIX V

APPLICATION AND AMBIENT FIELD LOG SHEETS

LOG BOOK

Project: Simazine Pesticide Monitoring

Project #: C97-072

Log #	Sample ID	Date On/Off	Time On/Off	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
1	[redacted] WB	12/18	1545			
		12/19	1340	43	K/(PC)	KEM
2	[redacted] WFS1	12/18	1545			
		12/19	1345	#42		
3	SB	12/18	1550			
		12/19	1350	45		
4	SFS2	12/18	1530			
		12/19	1350	(1350) #44		
5	EB	12/18	1555			
		12/19	1355	4A		
6	EFS3	12/18	1555			
		12/19	1355	4B		
7	NB	12/18	1600			
		12/19	[redacted]	1400 40		
8	NFS4	12/18	1600			
		12/19	1400	41	↓	↓
9	W1	12/19	1400			
		12/19	1615		O	
10	S1	12/19	1400			
		12/19	1620	44	↓	
11	S1D	12/19	1400			
		12/19	1620	45		
12	E1	12/19	1400			
		12/19	1610	4A		
13	[redacted] N1	12/19	1400			
		12/19	1615		↓	
14	E2	12/19	1610			
		12/19	1705		[redacted] (PC)	
15	N2	12/19	1615			
		12/19	1710			
16	W2	12/19	1615			
		12/19	1710			
17	S2	12/19	1620			
		12/19	1715	44		
18	S2D	12/19	1620			
		12/19	1715	45		
19	E3	12/19	1705			
		12/19	1905		X	
20	N3	12/19	1710			
		12/19	1910			
21	W3	12/19	1710			
		12/19	1910			
22	S3	12/19	1715			
		12/19	1910			
23	S3D	12/19	1715		↓	
		12/19	1905			

LOG BOOK

Project: Simazine Pesticide Monitoring

Project #: C97-072

Log #	Sample ID	Date On/Off	Time On/Off	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
24	E4	12/19	1905		PC	KEM
		12/20	0800			
25	N4	12/19	1910			
		12/20	0805			
26	W4	12/19	1910			
		12/20	0810			
27	S4	12/19	1915			
		12/20	0815			
28	S4D	12/19	1915			
		12/20	0815	COLD		
		12/20	0800	FROST		
29	E5	12/20	1605		PC	
30	N5	12/20	0805			
		12/20	1610			
31	W5	12/20	0810			
		12/20	1610			
32	S5	12/20	0815			
		12/20	1615			
33	S5D	12/20	0815			
		12/20	1615			
34	E6	12/20	1605		O	
		12/21	0800			
35	N6	12/20	1610			
		12/21	0810			
36	W6	12/20	1610			
		12/21	0810			
37	S6	12/20	1615			
		12/21	0815			
38	S6D	12/20	1615			
		12/21	0815			
39	E7	12/21	0800		X	
		12/21	1600	COLD		
40	N7	12/21	0810			
		12/21	1610	FROST		
41	W7	12/21	0810			
		12/21	1610			
42	S7	12/21	0815			
		12/21	1615			
43	S7D	12/21	0815			
		12/21	1615			

LOG BOOK

Project: Simazine Pesticide Monitoring

Project #: C97-072

Log #	Sample ID	Date On/Off	Time On/Off	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
44	E8	12/21 12/22	1600 1600		K/PC	KEM
45	N8	12/21 12/22	1610 1610			
46	W8	12/21 12/22	1610 1610			
47	S8	12/21 12/22	1615 1615			
48	S8D	12/21 12/22	1615 1615			
49	TS 1	12/22	1620	overcast at Kenaboi		
50	TS 2	"	"			
51	TS 3	"	"			
52	TS 4	"	"			
~~53~~	~~TS~~	"	"			
53	TB	"	"			

LOG BOOK

Project: Simazine Ambient in Fresno Co.

Project #: C97-071

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
1	PAR-1	02/13/98	1415	~~PC~~ START = 3.0	PC/R	Wayne McCracken
		02/19/98	1445	STOP = 3.0		
2	PAR-1D	02/13/98	1415	~~PC~~ START = 3.0	PC/R	WAYNE McCRACKEN
		02-19-98	1445	STOP = 3.0		
3	FOW-1	02/13/98	1450	START = 3.0	PC/R	WMC
		02-19-98	1520	STOP = 3.0		
4	FOW-1D	02/13/98	1450	START = 3.0	PC/R	WMC
		02-19-98	1520	STOP = 3.0		
5	ALV-1	02/13/98	1520	START = 3.0	PC/R	WMC
		02-19-98	1555	STOP = 3.0		
6	ALV-1D	02/13/98	1520	START = 3.0	PC/R	WMC
		02/19/98	1555	STOP = 3.0		
7	CHN-1	02/18/98	1600	START = 3.0	PC/R	WMC
		02-19-98	1645	STOP = 3.0		
8	CHW-1D	02/18/98	1600	START = 3.0	PC/R	WMC
		02-19-98	1645	STOP = 3.0		
9	ARB-1	02/18/98	1645	START = 3.0	PC/R	WMC
		02-19-98	1720	STOP = 3.0		
10	ARB-1D	02/18/98	1645	START = 3.0	PC/R	WMC
		02-19-98	1720	STOP = 3.0		
11	FS-1	02-18-98	1645	START = 3.0	PC/R	WMC
		02-19-98	1720	STOP = 3.0		
12	FS-2	02-18-98	1645	START = 3.0	PC/R	WMC
		02-19-98	1720	STOP = 3.0		
13	PAR-2	02-19-98	1445	START = 3.0	R/PC	WMC
		02-20-98	1450	STOP = 3.0		
14	FOW-2	02-19-98	1520	START = 3.0	R/PC	WMC
		02-20-98	1420	STOP = 3.0		
15	ALV-2	02-19-98	1555	START = 3.0	R/PC	WMC
		02-20-98	1445	STOP = 3.0		
16	CHW-2	02-19-98	1645	START = 3.0	R/k	WMC
		02-20-98	1530	STOP = 3.0		
17	ARB-2	02-19-98	1720	START = 3.0	R/k	WMC
		02-20-98	1615	STOP = 3.0		
18	FS-3	02-19-98	1720	START = 3.0	R/k	WMC
		02-20-98	1615	STOP = 3.0		
19	FS-4	02-19-98	1720	START = 3.0	R/k	WMC
		02-20-98	1615	STOP = 3.0		
20	FS-5	02-19-98	1720	START = 3.0	R/k	WMC
		02-20-98	1615	STOP = 3.0		
21	TS-1	02-20-98	1615	TRIPSPIKE	K/K	WMC
		02-20-98	1615			
22	TS-2	02-23-98	1105	TRIP SPIKE	PC/PC	WMC
		02-23-98	1105			

LOG BOOK

Project: Simazine Ambient in Fresno Co.

Project #: C97-071

R = RAIN
F = FOG

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
23	PAR-3	02-23-98	1135	START = 3.0	R/k	WAYNE McCRACKIN
		02-24-98	1245	STOP = 3.0		
24	FCW-3	02-23-98	1155	START = 3.0	PC/k	W.MC.
		02-24-98	1315	STOP = 3.0		
25	ALV-3	02-23-98	1230	START = 3.0	R/K	W.MC
		02-24-98	1345	STOP = 3.0		
26	CHW-3	02-23-98	1310	START = 3.0	PC/K	WMC
		02-24-98	1420	STOP = 3.0		
27	ARB-3	02-23-98	1420	START = 3.0	R/K	WMC
		02-24-98	1515	STOP = 3.0		
28	PAR-4	02-24-98	1245	START = 3.0	K/PC	WMC
		02-25-98	1300	STOP = 3.0		
29	FOW-4	02-24-98	1315	START = 3.0	K/PC	WMC
		02-25-98	1330	STOP = 3.0		
30	ALV-4	02-24-98	1345	START = 3.0	PC/PC	WMC
		02-25-98	1355	STOP = 3.0		
31	CHW-4	02-24-98	1420	START = 3.0	PC/PC	WMC
		02-25-98	1440	STOP = 3.0		
32	ARB-4	02-24-98	1515	START = 3.0	PC/PC	WMC
		02-25-98	1525	STOP = 3.0		
33	PAR-5	02-25-98	1300	START = 3.0	PC/PC	WMC
		02-26-98	1255	STOP = 3.0		
34	PAR-5D	02-25-98	1300	START = 3.0	PC/PC	WMC
		2-26-98	1255	STOP = 3.0		
35	FOW-5	02-25-98	1330	START = 3.0	PC/PC	WMC
		02-26-98	1325	STOP = 3.0		
36	FOW-5D	02-25-98	1330	START = 3.0	PC/PC	WMC
		2-26-98	1325	STOP = 3.0		
37	ALV-5	02-25-98	1355	START = 3.0	PC/PC	WMC
		02-26-98	1350	STOP = 3.0		
38	ALV-5D	02-25-98	1355	START = 3.0	PC/PC	WMC
		02-26-98	1350	STOP = 3.0		
39	CHW-5	02-25-98	1440	START = 3.0	PC/PC	WMC
		02-26-98	1440	STOP = 3.0		
40	CHW-5D	02-25-98	1440	START = 3.0	PC/PC	WMC
		02-26-98	1440	STOP = 3.0		
41	ARB-5	02-25-98	1525	START = 3.0	PC/PC	WMC
		02-26-98	1540	STOP = 3.0		
42	ARB-5D	02-25-98	1525	START = 3.0	PC/PC	WMC
		02-26-98	1540	STOP = 3.0		
43	PAR-6	02-26-98	1255	START = 3.0	PC/K	WMC
		02-27-98	1315	STOP = 3.0		
44	FOW-6	02-26-98	1325	START = 3.0	PC/PC	WMC
		02-27-98	1345	STOP = 3.0		

LOG BOOK
Project: Simazine Ambient in Fresno Co.
Project #: C97-071

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear / taken by	
45	ALV-6	02-26-98	1350	START = 3.0	PC/PC	WAYNE MCCRACKEN
		02-27-98	1410	STOP = 3.0		
46	CHW-6	02-26-98	1440	START = 3.0	PC/PC	WAYNE MCCRACKEN
		02-27-98	1455	STOP = 3.0		
47	ARB-6	02-26-98	1540	START = 3.0	PC/PC	WMC
		02-27-98	1625	STOP = 3.0		
48	PAR-7	03-02-98	1310	START = 3.0	K/PC	WMC
		3-3-98	1315	STOP = 3.0		
49	FOW-7	3-02-98	1340	START = 3.0	K/PC	WMC
		3-3-98	1345	STOP = 3.0		
50	ALV-7	3-02-98	1410	START = 3.0	PC/PC	WMC
		3-3-98	1415	STOP = 3.0		
51	CHW-7	3-02-98	1455	START = 3.0	PC/K	WMC
		3-3-98	1500	STOP = 3.0		
52	ARB-7	3-02-98	1600	START = 3.0	PC/K	WMC
		3-3-98	1530	STOP = 3.0		
53	TS-3	3-02-98	1600	TRIP SPIKE	PC/PC	WMC
		3-02-98	1600			
54	TS-4	3-02-98	1600	TRIP SPIKE	PC/PC	WMC
		3-02-98	1600			
55	TS-5	3-02-98	1600	TRIP SPIKE	PC/PC	WMC
		3-02-98	1600			
56	PAR-8	3-3-98	1315	START = 3.0	PC/K	WMC
		3-4-98	1245	STOP = 3.0		
57	FOW-8	3-3-98	1345	START = 3.0	PC/K	WMC
		3-4-98	1320	STOP = 3.0		
58	ALV-8	3-3-98	1415	START = 3.0	PC/K	WMC
		3-4-98	1355	STOP = 3.0		
59	CHW-8	3-3-98	1500	START = 3.0	K/K	WMC
		3-4-98	1440	STOP = 3.0		
60	ARB-8	3-3-98	1530	START = 3.0	K/K	WMC
		3-4-98	1520	STOP = 3.0		
61	PAR-9	3-4-98	1245	START = 3.0	K/PC	WMC
		3-5-98	1310	STOP = 3.0		
62	PAR-9D	3-4-98	1245	START = 3.0	K/PC	WMC
		3-5-98	1310	STOP = 3.0		
63	FOW-9	3-4-98	1320	START = 3.0	K/PC	WMC
		3-5-98	1345	STOP = 3.0		
64	FOW-9D	3-4-98	1320	START = 3.0	K/PC	WMC
		3-5-98	1345	STOP = 3.0		
65	ALV-9D	3-4-98	1355	START = 3.0	K/R	WMC
		3-5-98	1325	STOP = 3.0		
66	ALV-9	3-4-98	1355	START = 3.0	K/R	WMC
		3-5-98	1325	STOP = 3.0		

LOG BOOK

Project: Simazine Ambient in Fresno Co.

Project #: C97-071

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
67	CHW-9	3-4-98	1440	START = 3.0	K/R	WAYNE MCCARCOR
		3-5-98	1510	STOP = 3.0		
68	CHW-9D	3-4-98	1440	START = 3.0	K/R	WMC
		3-5-98	1510	STOP = 3.0		
69	ARB-9	3-4-98	1520	START = 3.0	K/R	WMC
		3-5-98	1600	STOP = 3.0		
70	ARB-9D	3-4-98	1520	START = 3.0	K/R	WMC
		3-5-98	1600	STOP = 3.0		
71	PAR-10	3-5-98	1310	START = 3.0	PC/PC	WMC
		3-6-98	1235	STOP = 3.0		
72	FOW-10	3-5-98	1345	START = 3.0	PC/PC	WMC
		3-6-98	1305	STOP = 3.0		
73	ALV-10	3-5-98	1425	START = 3.0	R/PC	WMC
		3-6-98	1345	STOP = 3.0		
74	CHW-10	3-5-98	1510	START = 3.0	R/PC	WMC
		3-6-98	1435	STOP = 3.0		
75	ARB-10	3-5-98	1600	START = 3.0	R/PC	WMC
		3-6-98	1520	STOP = 3.0		
76	PAR-11	3-9-98	1310	START = 3.0	K/K	WMC
		3-10-98	1225	STOP = 3.0		
77	FOW-11	3-9-98	1335	START = 3.0	K/K	WMC
		3-10-98	1300	STOP = 3.0		
78	ALV-11	3-9-98	1415	START = 3.0	K/K	WMC
		3-10-98	1345	STOP = 3.0		
79	CHW-11	3-9-98	1450	START = 3.0	K/K	WMC
		3-10-98	1435	STOP = 3.0		
80	ARB-11	3-9-98	1605	START = 3.0	K/K	WMC
		3-10-98	1525	STOP = 3.0		
81	PAR-12	3-10-98	1225	START = 3.0	K/K	WMC
		3-11-98	1315	STOP = 3.0		
82	FOW-12	3-10-98	1300	START = 3.0	K/K	WMC
		3-11-98	1350	STOP = 3.0		
83	ALV-12	3-10-98	1345	START = 3.0	K/K	WMC
		3-11-98	1435	STOP = 3.0		
84	CHW-12	3-10-98	1435	START = 3.0	K/K	WMC
		3-11-98	1520	STOP = 3.0		
85	ARB-12	3-10-98	1525	START = 3.0	K/K	WMC
		3-11-98	1610	STOP = 3.0		
86	PAR-13	3-11-98	1315	START = 3.0	K/K	WMC
		3-12-98	1300	STOP = 3.0		
87	PAR-13D	3-11-98	1315	START = 3.0	K/K	WMC
		3-12-98	1300	STOP = 3.0		
88	FOW-13	3-11-98	1350	START = 3.0	K/K	WMC
		3-12-98	1335	STOP = 3.0		

LOG BOOK

Project: Simazine Ambient in Fresno Co.

Project #: C97-071

R = RAIN
F = FOG

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
89	FOW-13D	3-11-98	1350	START = 3.0	K/K	WAYNE MCCRACKEN
		3-12-98	1335	STOP = 3.0		
90	ALV-13	3-11-98	1435	START = 3.0	K/PC	WMC
		3-12-98	1415	STOP = 3.0		
91	ALV-13D	3-11-98	1435	START = 3.0	K/PC	WMC
		3-12-98	1415	STOP = 3.0		
92	CHW-13	3-11-98	1520	START = 3.0	K/PC	WMC
		3-12-98	1500	STOP = 0.0 → PUMP ~~NOT~~ STOPPED WORKING		
93	CHW-13D	3-11-98	1520	START = 3.0	K/PC	WMC
		3-12-98	1500	STOP = 0.0 → PUMP ~~NOT~~ STOPPED WORKING		
94	ARB-13	3-11-98	1630	START = 3.0	K/PC	WMC
		3-12-98	1635	STOP = ~~3.0~~ 3.0		
95	ARB-13D	3-11-98	1630	START = 3.0	K/PC	WMC
		3-12-98	1635	STOP = 3.0		
96	PAR-14	3-12-98	1300	START = 3.0	K/O	WMC
		3-13-98	1310	STOP = 3.0		
97	FOW-14	3-12-98	1335	START = 3.0	K/O	WMC
		3-13-98	1350	STOP = 3.0		
98	ALV-14	3-12-98	1415	START = 3.0	PC/R	WMC
		3-13-98	1435	STOP = 3.0		
99	CHW-14	3-12-98	1500	→ PUMP NOT WORKING (COMPRESSOR) (SHORT IN WIRE)	PC/R	WMC
		3-13-98	—			
100	ARB-14	3-12-98	1635	START = 3.0	PC/O	WMC
		3-13-98	1630	STOP = 3.0		
101	PAR-15	3-16-98	1330	START = 3.0	PC/K	WMC
		3-17-98	1415	STOP = 3.0		
102	FOW-15	3-16-98	1410	START = 3.0	PC/K	WMC
		3-17-98	1445	STOP = 3.0		
103	ALV-15	3-16-98	1455	START = 3.0	PC/K	WMC
		3-17-98	1525	STOP = 3.0		
104	CHW-15	3-16-98	1550	START = 3.0	PC/K	WMC
		3-17-98	1620	STOP = 3.0		
105	ARB-15	3-16-98	1650	START = 3.0	PC/K	WMC
		3-17-98	1735	STOP = 3.0		
106	PAR-16	3-17-98	1415	START = 3.0	K/K	WMC
		3-18-98	1310	STOP = 3.0		
107	FOW-16	3-17-98	1405	START = 3.0	K/K	WMC
		3-18-98	1340	STOP = 3.0		
108	ALV-16	3-17-98	1525	START = 3.0	K/K	WMC
		3-18-98	1420	STOP = 3.0		
109	CHW-16	3-17-98	1620	START = 3.0	K/K	WMC
		3-18-98	1530	STOP = 3.0		
110	ARB-16	3-17-98	1735	START = 3.0	K/K	WMC
		3-18-98	1645	STOP = 3.0		

LOG BOOK

Project: Simazine Ambient in Fresno Co.

Project #: C97-071

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
111	PAR-17	3-18-98	1310	START = 3.0	K/K	WAYNE MCLAUGHLIN
		3-19-98	1405	STOP = 3.0		
112	PAR-17D	3-18-98	1310	START = 3.0	K/K	WMC
		3-19-98	1405	STOP = 3.0		
113	FOW-17	3-18-98	840	START = 3.0	K/K	WMC
		3-19-98	1435	STOP = 3.0		
114	FOW-17D	3-18-98	1340	START = 3.0	K/K	WMC
		3-19-98	1435	STOP = 3.0		
115	ALV-17	3-18-98	1420	START = 3.0	K/K	WMC
		3-19-98	1520	STOP = 3.0		
116	ALV-17D	3-18-98	1420	START = 3.0	K/K	WMC
		3-19-98	1520	STOP = 3.0		
117	CHW-17	3-18-98	1530	START = 3.0	K/K	WMC
		3-19-98	1625	STOP = 3.0		
118	CHW-17D	3-18-98	1530	START = 3.0	K/K	WMC
		3-19-98	1625	STOP = 3.0		
119	ARB-17	3-18-98	1645	START = 3.0	K/K	WMC
		3-19-98	1725	STOP = 3.0		
120	ARB-17D	3-18-98	1645	START = 3.0	K/K	WMC
		3-19-98	1725	STOP = 3.0		
121	PAR-18	3-19-98	1405	START = 3.0	K/K	WMC
		3-20-98	1415	STOP = 3.0		
122	FOW-18	3-19-98	1435	START = 3.0	K/K	WMC
		3-20-98	1445	STOP = 3.0		
123	ALV-18	3-19-98	1520	START = 3.0	K/K	WMC
		3-20-98	1525	STOP = 3.0		
124	CHW-18	3-19-98	1624	START = 3.0	K/K	WMC
		3-20-98	1630	STOP = 3.0		
125	ARB-18	3-19-98	1725	START = 3.0	K/K	WMC
		3-20-98	1740	STOP = 3.0		
126	PAR-19	3-23-98	1320	START = 3.0	K/R	WMC
		3-24-98	1415	STOP = 3.0		
127	FOW-19	3-23-98	1400	START = 3.0	K/R	WMC
		3-24-98	1450	STOP = 3.0		
128	ALV-19	3-23-98	1495	START = 3.0	K/R	WMC
		3-24-98	1535	STOP = 3.0		
129	CHW-19	3-23-98	1520	START = 3.0	K/R	WMC
		3-24-98	1640	STOP = 3.0		
130	ARB-19	3-23-98	1630	START = 3.0	K/R	WMC
		3-24-98	1725	STOP = 3.0		
131	PAR-20	3-24-98	1415	START = 3.0	R/O	WMC
		3-25-98	1420	STOP = 3.0		
132	FOW-20	3-24-98	1450	START = 3.0	R/O	WMC
		3-25-98	1455	STOP = 3.0		

LOG BOOK
Project: Simazine Ambient in Fresno Co.
Project #: C97-071

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
133	ALV-20	3-24-98	1535	START = 3.0	R/O	WAYNE McCARTHY
		3-25-98	1535	STOP = 3.0		
134	CHW-20	3-24-98	1640	START = 3.0	R/O	WMC
		3-25-98	1640	STOP = 3.0		
135	ARB-20	3-24-98	1725	START = 3.0	R/O	WMC
		3-25-98	1720	STOP = 3.0		
136	PAR-21	3-25-98	1420	START = 3.0	O/O	WMC
		3-26-98	1400	STOP = 3.0		
137	PAR-21D	3-25-98	1420	START = 3.0	O/O	WMC
		3-26-98	1400	STOP = 3.0		
138	FOW-21	3-25-98	1455	START = 3.0	O/O	WMC
		3-26-98	1435	STOP = 3.0		
139	FOW-21D	3-25-98	1455	START = 3.0	O/O	WMC
		3-26-98	1435	STOP = 3.0		
140	ALV-21	3-25-98	1535	START = 3.0	O/PC	WMC
		3-26-98	1520	STOP = 3.0		
141	ALV-21D	3-25-98	1535	START = 3.0	O/PC	WMC
		3-26-98	1520	STOP = 3.0		
142	CHW 21	3-25-98	1640	START = 3.0	O/PC	WMC
		3-26-98	1625	STOP = 3.0		
143	CHW 21D	3-25-98	1640	START = 3.0	O/PC	WMC
		3-26-98	1625	STOP = 3.0		
144	ARB 21	3-25-98	1720	START = 3.0	O/PC	WMC
		3-26-98	1710	STOP = 3.0		
145	ARB 21D	3-25-98	1720	START = 3.0	O/PC	WMC
		3-26-98	1710	STOP = 3.0		
146	PAR 22	3-26-98	1400	START = 3.0	O/R	WMC
		3-27-98	1345	STOP = 3.0		
147	FOW 22	3-26-98	1435	START = 3.0	O/R	WMC
		3-27-98	1420	STOP = 3.0		
148	ALV 22	3-26-98	1520	START = 3.0	PC/O	WMC
		3-27-98	1505	STOP = 3.0		
149	CHW 22	3-26-98	1625	START = 3.0	PC/PC	WMC
		3-27-98	1610	STOP = 3.0		
150	ARB 22	3-26-98	1710	START = 3.0	PC/C	WMC
		3-27-98	1655	STOP = 3.0		
151	PAR 23	3-30-98	1335	START = 3.0	K/R	WMC
		3-31-98	1430	STOP = 3.0		
152	FOW 23	3-30-98	1415	START = 3.0	K/R	WMC
		3-31-98	1510	STOP = 3.0		
153	ALV 23	3-30-98	1500	START = 3.0	K/R	WMC
		3-31-98	1600	STOP = 3.0		
154	CHW 23	3-30-98	1550	START = 3.0	K/R	WMC
		3-31-98	1700	STOP = 3.0		

PROJECT SPECIATE AMBIENT IN FRESNO

PROJECT #: C97-071

LOG #	SAMPLE ID	DATE	TIME	COMMENT	WEATHER	TAKEN BY
155	ARB-23	3-30-98 3-31-98	1325 1755	START 3.0 STOP = 3.0	R/O	WMC
156	PAR-24	3-31-98 04-01-98	1430 1540	START = 3.0 STOP = 3.0	R/O	WMC
157	FOW-24	3-31-98 4-01-98	1510 1615	START = 3.0 STOP = 3.0	R/O	WMC
158	ALV-24	3-31-98 4-01-98	1600 1710	START = 3.0 STOP = 3.0	R/PC	WMC
159	CHW-24	3-31-98 4-01-98	1700 1755	START = 3.0 STOP = 3.0	R/PC	WMC
160	ARB-24	3-31-98 4-01-98	1755 1840	START = 3.0 STOP = 3.0	R/PC	WMC

APPENDIX VI

SIMAZINE APPLICATION METEOROLOGICAL DATA

Simazine Application Meteorological Data, December 1998 (15 min. aves.)

Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity	Wind Direction in degrees oriented to geo. N
352	1439	3	74	not collected	not collected	0
352	1509	10	72	not collected	not collected	337
352	1539	2	74	not collected	not collected	315
352	1609	0	73	not collected	not collected	NA
352	1639	0	69	not collected	not collected	NA
352	1709	2	63	not collected	not collected	315
352	1739	1	58	not collected	not collected	NA
352	1809	2	54	not collected	not collected	45
352	1839	3	50	not collected	not collected	45
352	1909	0	48	not collected	not collected	NA
352	1939	3	45	not collected	not collected	45
352	2009	3	44	not collected	not collected	45
352	2039	1	43	not collected	not collected	45
352	2109	2	41	not collected	not collected	45
352	2139	1	40	not collected	not collected	45
352	2209	2	39	not collected	not collected	45
352	2239	3	38	not collected	not collected	45
352	2309	7	38	not collected	not collected	202
352	2339	8	38	not collected	not collected	180
353	0009	5	40	not collected	not collected	180
353	0039	6	41	not collected	not collected	180
353	0109	6	42	not collected	not collected	157
353	0139	3	42	not collected	not collected	135
353	0209	4	42	not collected	not collected	157
353	0239	1	41	not collected	not collected	157
353	0309	1	40	not collected	not collected	NA
353	0339	4	38	not collected	not collected	157
353	0409	4	38	not collected	not collected	202
353	0439	7	39	not collected	not collected	202
353	0509	7	40	not collected	not collected	202
353	0539	6	41	not collected	not collected	180
353	0609	6	43	not collected	not collected	202
353	0639	7	44	not collected	not collected	180
353	0709	3	43	not collected	not collected	202
353	0739	2	41	not collected	not collected	202
353	0809	6	40	not collected	not collected	202
353	0839	7	43	not collected	not collected	180
353	0909	12	50	not collected	not collected	202
353	0939	11	55	not collected	not collected	202
353	955	2.1	53	999	88	156
353	1010	4.0	54	999	86	189

Simazine Application Meteorological Data, December 1998 (15 min. aves.)

Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity	Wind Direction in degrees oriented to geo. N
353	1025	4.9	54	999	85	216
353	1040	2.4	54	999	84	215
353	1055	2.9	54	998	84	217
353	1110	3.4	54	998	84	184
353	1125	0.0	54	998	84	180
353	1140	0.0	55	998	83	177
353	1155	0.0	55	998	81	326
353	1210	0.1	55	998	77	300
353	1225	1.9	53	998	79	328
353	1240	2.4	54	998	77	286
353	1255	0.4	52	998	80	288
353	1310	1.7	51	998	82	321
353	1325	1.9	50	998	90	297
353	1340	2.1	51	998	92	313
353	1355	3.3	50	998	93	343
353	1410	3.3	50	998	87	308
353	1425	4.0	51	998	86	359
353	1440	5.1	50	998	83	305
353	1455	5.0	51	998	82	335
353	1510	0.7	50	998	81	322
353	1525	3.2	51	998	78	339
353	1540	6.5	52	998	77	335
353	1555	6.5	51	998	75	344
353	1610	3.2	50	999	75	319
353	1625	3.5	49	999	76	258
353	1640	2.2	48	999	77	347
353	1655	1.5	47	999	79	326
353	1710	0.0	47	999	79	358
353	1725	0.6	47	999	81	315
353	1740	3.1	47	999	81	321
353	1755	3.2	47	999	80	354
353	1810	4.8	47	999	77	344
353	1825	0.8	46	999	78	287
353	1840	3.7	46	1000	78	321
353	1855	0.8	46	1000	79	266
353	1910	2.5	46	1000	71	320
353	1925	3.6	45	1000	68	328
353	1940	0.0	44	1000	70	342
353	1955	0.0	43	1001	71	1
353	2010	0.0	42	1001	73	107
353	2025	0.0	42	1001	73	321

Simazine Application Meteorological Data, December 1998 (15 min. aves.)

Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity	Wind Direction in degrees oriented to geo. N
353	2040	0.3	43	1001	71	320
353	2055	0.0	42	1001	74	272
353	2110	0.0	41	1001	74	315
353	2125	0.0	39	1002	78	333
353	2140	0.0	39	1002	81	149
353	2155	0.0	38	1002	86	306
353	2210	0.0	37	1002	91	278
353	2225	0.0	36	1002	93	276
353	2240	0.0	36	1002	98	170
353	2255	0.0	36	1003	90	306
353	2310	0.0	36	1003	83	318
353	2325	0.0	36	1003	91	80
353	2340	0.0	36	1002	87	159
353	2355	0.0	34	1002	97	146
354	0010	0.0	34	1002	96	128
354	0025	0.0	34	1002	95	104
354	0040	0.0	33	1002	100	104
354	0055	0.0	32	1002	100	334
354	0110	0.0	31	1002	100	358
354	0125	0.0	31	1002	100	356
354	0140	0.0	30	1002	100	352
354	0155	0.0	30	1002	100	365
354	0210	0.0	31	1002	100	49
354	0225	0.0	31	1002	100	18
354	0240	0.0	31	1002	100	75
354	0255	0.0	30	1002	100	4
354	0310	0.0	31	1002	100	64
354	0325	0.0	29	1002	100	286
354	0340	0.0	29	1002	100	298
354	0355	0.0	29	1002	100	23
354	0410	0.0	29	1002	100	68
354	0425	0.0	29	1002	100	346
354	0440	0.0	29	1002	100	46
354	0455	0.0	29	1002	100	115
354	0510	0.0	29	1002	100	55
354	0525	0.0	29	1003	100	10
354	0540	0.0	29	1003	100	74
354	0555	0.0	28	1003	100	82
354	0610	4.8	30	1002	100	127
354	0625	0.1	31	1002	100	357
354	0640	0.0	31	1003	100	356

Simazine Application Meteorological Data, December 1998 (15 min. aves.)

Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity	Wind Direction in degrees oriented to geo. N
354	0655	0.0	32	1003	100	346
354	0710	0.0	32	1003	100	349
354	0725	0.0	32	1003	100	38
354	0740	1.0	32	1003	100	79
354	0755	0.0	33	1003	100	51
354	0810	0.0	34	1003	100	364
354	0825	0.0	35	1003	100	326
354	0840	0.0	36	1003	100	324
354	0855	0.0	37	1003	100	69
354	0910	1.7	39	1004	100	325
354	0925	0.0	39	1004	100	294
354	0940	0.2	40	1004	98	10
354	0955	0.0	43	1004	92	324
354	1010	0.0	43	1004	89	118
354	1025	0.0	44	1004	85	128
354	1040	4.3	44	1003	81	159
354	1055	4.2	45	1003	75	93
354	1110	2.6	44	1003	81	152
354	1125	0.0	45	1003	75	91
354	1140	0.0	45	1003	74	134
354	1200	0.0	48	not collected	not collected	NA
354	1215	0.0	51	not collected	not collected	NA
354	1230	0.0	55	not collected	not collected	NA
354	1245	0.0	54	not collected	not collected	NA
354	1300	0.0	53	not collected	not collected	NA
354	1315	0.0	53	not collected	not collected	NA
354	1330	0.0	53	not collected	not collected	NA
354	1345	0.0	51	not collected	not collected	NA
354	1400	0.0	50	not collected	not collected	NA
354	1415	0.0	49	not collected	not collected	NA
354	1430	0.0	48	not collected	not collected	NA
354	1445	0.0	48	not collected	not collected	NA
354	1500	0.0	49	not collected	not collected	NA
354	1515	0.0	49	not collected	not collected	NA
354	1530	0.0	48	not collected	not collected	NA
354	1545	0.0	47	not collected	not collected	NA
354	1600	0.0	46	not collected	not collected	NA
354	1615	0.0	46	not collected	not collected	NA
354	1630	0.0	45	not collected	not collected	NA
354	1645	0.0	44	not collected	not collected	NA
354	1700	0.0	44	not collected	not collected	NA

Simazine Application Meteorological Data, December 1998 (15 min. aves.)

Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity	Wind Direction in degrees oriented to geo. N
354	1715	0.0	43	not collected	not collected	NA
354	1730	0.0	42	not collected	not collected	NA
354	1745	0.0	42	not collected	not collected	NA
354	1800	0.0	41	not collected	not collected	NA
354	1815	0.0	41	not collected	not collected	NA
354	1830	0.0	40	not collected	not collected	NA
354	1845	0.0	40	not collected	not collected	NA
354	1900	0.0	40	not collected	not collected	NA
354	1915	0.0	38	not collected	not collected	NA
354	1930	0.0	38	not collected	not collected	NA
354	1945	0.0	37	not collected	not collected	NA
354	2000	0.0	36	not collected	not collected	NA
354	2015	0.0	35	not collected	not collected	NA
354	2030	0.0	34	not collected	not collected	NA
354	2045	0.0	34	not collected	not collected	NA
354	2100	0.0	33	not collected	not collected	NA
354	2115	0.0	33	not collected	not collected	NA
354	2130	0.0	32	not collected	not collected	NA
354	2145	0.0	32	not collected	not collected	NA
354	2200	0.0	31	not collected	not collected	NA
354	2215	0.0	30	not collected	not collected	NA
354	2230	0.0	29	not collected	not collected	NA
354	2245	0.0	29	not collected	not collected	NA
354	2300	0.0	28	not collected	not collected	NA
354	2315	0.0	28	not collected	not collected	NA
354	2330	0.0	27	not collected	not collected	NA
354	2345	0.0	27	not collected	not collected	NA
355	2400	0.0	26	not collected	not collected	NA
355	0015	0.0	26	not collected	not collected	NA
355	0030	0.0	26	not collected	not collected	NA
355	0045	0.0	25	not collected	not collected	NA
355	0100	0.0	25	not collected	not collected	NA
355	0115	0.0	25	not collected	not collected	NA
355	0130	0.0	25	not collected	not collected	NA
355	0145	0.0	25	not collected	not collected	NA
355	0200	0.0	25	not collected	not collected	NA
355	0215	0.0	25	not collected	not collected	NA
355	0230	0.0	25	not collected	not collected	NA
355	0245	0.0	26	not collected	not collected	NA
355	0300	0.0	26	not collected	not collected	NA
355	0315	0.0	26	not collected	not collected	NA

Simazine Application Meteorological Data, December 1998 (15 min. aves.)

Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity	Wind Direction in degrees oriented to geo. N
355	0330	2.0	26	not collected	not collected	270
355	0345	2.0	25	not collected	not collected	270
355	0400	2.0	24	not collected	not collected	270
355	0415	0.0	24	not collected	not collected	NA
355	0430	0.0	24	not collected	not collected	NA
355	0445	0.0	25	not collected	not collected	NA
355	0500	0.0	26	not collected	not collected	NA
355	0515	0.0	27	not collected	not collected	NA
355	0530	0.0	27	not collected	not collected	NA
355	0545	0.0	28	not collected	not collected	NA
355	0600	1.0	28	not collected	not collected	247
355	0615	2.0	29	not collected	not collected	247
355	0630	2.0	29	not collected	not collected	247
355	0645	3.0	29	not collected	not collected	247
355	0700	5.0	29	not collected	not collected	225
355	0715	5.0	30	not collected	not collected	225
355	0730	5.0	30	not collected	not collected	225
355	0754	0.0	32	1014	99	73
355	0809	0.0	32	1014	99	76
355	0824	0.0	33	1015	100	73
355	0838	0.0	33	1015	100	175
355	0853	0.0	33	1015	100	227
355	0908	0.0	34	1015	100	253
355	0923	0.0	35	1015	100	278
355	0938	3.8	34	1016	100	218
355	0953	5.1	33	1016	100	210
355	1008	3.4	34	1016	100	192
355	1023	5.0	34	1016	100	226
355	1038	1.8	35	1016	100	276
355	1053	2.2	36	1015	100	211
355	1108	0.2	39	1015	97	241
355	1123	0.0	40	1015	86	242
355	1138	0.7	39	1014	81	245
355	1153	1.2	41	1014	78	272
355	1208	0.3	42	1014	71	216
355	1223	3.1	39	1013	70	225
355	1238	0.0	40	1013	72	190
355	1253	0.0	41	1013	72	110
355	1308	1.8	44	1013	65	252
355	1323	1.3	42	1013	61	202
355	1338	3.3	40	1013	65	206

Simazine Application Meteorological Data, December 1998 (15 min. aves.)

Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity	Wind Direction in degrees oriented to geo. N
355	1353	0.7	40	1013	69	200
355	1408	3.3	40	1013	71	298
355	1423	0.3	40	1013	71	318
355	1438	2.0	41	1013	71	237
355	1453	0.0	42	1012	68	354
355	1508	0.3	43	1012	66	7
355	1523	0.5	41	1012	66	3
355	1538	0.1	41	1012	66	52
355	1553	0.0	41	1012	70	81
355	1608	0.0	42	1012	67	365
355	1623	0.0	39	1011	70	28
355	1638	0.0	37	1011	73	333
355	1653	0.0	35	1011	79	25
355	1708	0.0	35	1011	83	314
355	1723	0.0	34	1011	85	318
355	1738	0.0	33	1011	90	356
355	1753	0.0	33	1011	94	330
355	1808	0.0	32	1011	96	350
355	1823	0.0	32	1011	98	346
355	1838	0.0	31	1011	98	355
355	1853	0.0	30	1011	96	355
355	1908	0.0	31	1011	99	355
355	1923	0.0	30	1011	100	127
355	1938	0.0	30	1011	100	128
355	1953	0.0	29	1011	99	128
355	2008	0.0	30	1011	100	207
355	2023	0.0	29	1011	100	225
355	2038	0.0	29	1011	100	224
355	2053	0.0	29	1011	100	114
355	2108	0.0	29	1011	100	110
355	2123	0.0	28	1011	100	107
355	2138	0.0	28	1011	100	348
355	2153	0.0	27	1011	100	349
355	2208	0.0	27	1011	100	349
355	2223	0.0	28	1011	100	349
355	2238	0.0	28	1011	100	214
355	2253	0.0	27	1011	100	215
355	2308	0.0	27	1011	100	216
355	2323	0.0	27	1010	100	59
355	2338	0.0	27	1010	100	50
355	2353	0.0	25	1010	99	7

Simazine Application Meteorological Data, December 1998 (15 min. aves.)

Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity	Wind Direction in degrees oriented to geo. N
356	0008	0.0	26	1010	98	44
356	0023	0.0	25	1010	100	334
356	0038	0.0	24	1010	100	356
356	0053	0.0	24	1010	100	361
356	0108	0.0	26	1010	100	51
356	0123	0.0	25	1010	100	350
356	0138	0.0	25	1010	100	23
356	0153	0.0	26	1010	100	87
356	0208	0.0	26	1009	100	13
356	0223	0.0	25	1009	100	356
356	0238	0.0	24	1009	100	347
356	0253	0.0	25	1009	99	308
356	0308	0.0	24	1009	100	334
356	0323	0.0	25	1009	100	338
356	0338	0.0	24	1009	99	7
356	0353	0.0	24	1009	100	356
356	0408	0.0	24	1009	99	21
356	0423	0.0	25	1009	100	26
356	0438	0.0	25	1009	100	26
356	0453	0.0	25	1009	100	27
356	0508	0.0	24	1009	100	300
356	0523	0.0	23	1009	99	312
356	0538	0.0	23	1008	97	333
356	0553	0.0	22	1008	99	342
356	0608	0.0	23	1008	100	337
356	0623	0.0	24	1008	100	347
356	0638	0.0	25	1008	100	2
356	0653	0.0	26	1009	100	28
356	0708	0.0	27	1009	100	34
356	0723	0.0	28	1009	100	96
356	0738	0.0	28	1009	100	83
356	0753	0.0	29	1009	100	193
356	0808	0.0	29	1009	100	224
356	0823	0.0	29	1009	100	306
356	0838	0.0	29	1009	100	225
356	0853	0.0	30	1010	100	232
356	0908	0.0	30	1010	100	247
356	0923	0.0	31	1010	100	250
356	0938	0.0	31	1010	100	194
356	0953	0.0	32	1010	100	205
356	1008	0.0	32	1010	100	257

Simazine Application Meteorological Data, December 1998 (15 min. aves.)

Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity	Wind Direction in degrees oriented to geo. N
356	1023	0.0	33	1010	100	206
356	1038	0.0	34	1009	100	305
356	1053	0.0	33	1009	99	259
356	1108	0.0	33	1009	100	220
356	1123	0.7	33	1009	97	262
356	1138	0.0	34	1008	96	213
356	1153	0.0	34	1008	96	225
356	1208	0.0	35	1008	94	264
356	1223	0.0	35	1008	90	195
356	1238	0.0	35	1008	91	186
356	1253	0.4	36	1008	89	286
356	1308	4.5	36	1007	82	240
356	1323	3.1	36	1007	81	238
356	1338	3.5	37	1007	79	173
356	1353	0.0	37	1007	76	186
356	1408	0.5	37	1007	77	224
356	1423	0.0	37	1007	76	133
356	1438	0.0	36	1007	76	80
356	1453	0.1	36	1007	73	224
356	1508	0.1	36	1007	73	195
356	1523	0.0	37	1007	74	182
356	1538	0.0	37	1007	72	192
356	1553	0.0	36	1007	73	132
356	1608	0.0	36	1007	75	122